AUTOMOTIVE INDUSTRIES

A CHILTON PUBLICATION

ENGINEERING . MANAGEMENT . PRODUCTION . DESIGN

"MAKING PRODUCTION

PAY".... an Al Exclusive Survey

SEE



MACHINE TOOL and PRODUCTION EQUIPMENT EDITION . . . Editorial Sections on Three Major National Expositions

SEPTEMBER 1, 1960

NEW TEMPEST 4-CYLINDER ENGINE

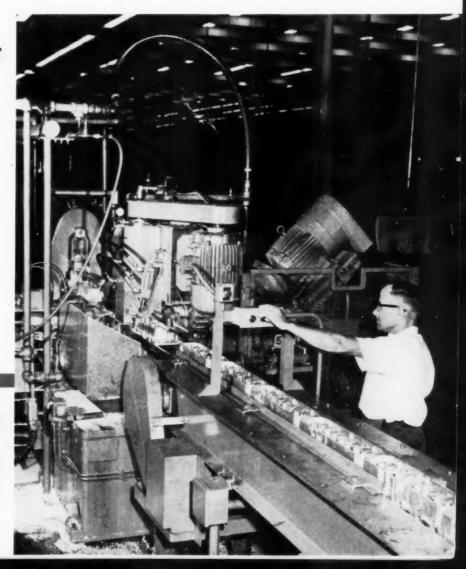
PAGE 65

BUILDING AMERICA'S FUTURE . . .

By Ludlow King
PAGE 70

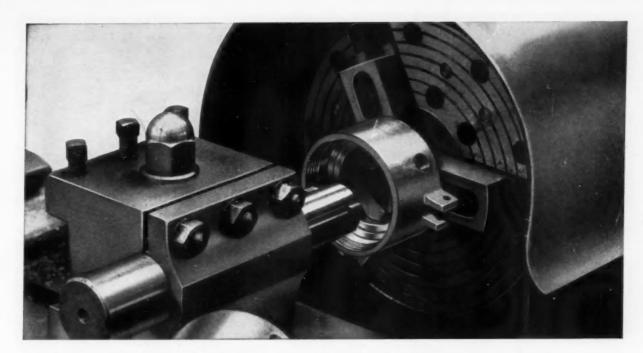
1961 Production at Oldsmobile

Multiple bank milling machine at the beginning of cylinder head machining operations on the all-aluminum F-85 engine





Tames tough steels. Gears from one to 300 inches in diameter are machined by Chicago Gear. Steels up to 375 Brinell hardness are worked. STANICUT Oil 208 BCS helps them do it. STANICUT 208 contains maximum amounts of sulfur, chlorine and compounding for handling tough alloy steels. It is vis-



Threaded in just 6 seconds on a Gisholt CRI-DAN

Here's a good example of what you can do on a Gisholt CRI-DAN Threading Lathe—an internal thread, 2%" diameter x ½" long, 12 t.p.i., cut in a phosphor-bronze bearing housing in just six seconds.

Speed and versatility obsolete other methods.

Note the other jobs shown—the variety of work and the fast threading times. Simple on a CRI-DAN—yet, each presented problems that

could only be solved at high cost using any other method.

It's Cri-Dan for highest quality, lowest cost.

The jobs shown here prove that close tolerance and high-quality finish requirements are met easily on the CRI-DAN. The CRI-DAN method, using an inexpensive single-point carbide tool, is faster and less costly than thread grinding or thread milling.



20 seconds—Zoom operating sleeve for movie camera; aluminum; 1.D. pilot dia. bored; tool indexed for threading a 2-start, 10625-pitch, 125"-lead, Class 4 16NS thread in the 1.610" center section.



15 seconds—spinning roller; stainless steel; 18 t.p.l. thread on %" diameter for %" length.



GET THE FACTS—NOW! Two models are available
—both are capable of handling high-production work
or a wide variety of short-run jobs Change-over averages ten minutes. Write for our catalog—or ask your
Gisholt Representative for complete details.



G SMACHINE COMPANY

Madison 10, Wisconsin

Investigate Gisholt's Extended Payment and Leasing Plans

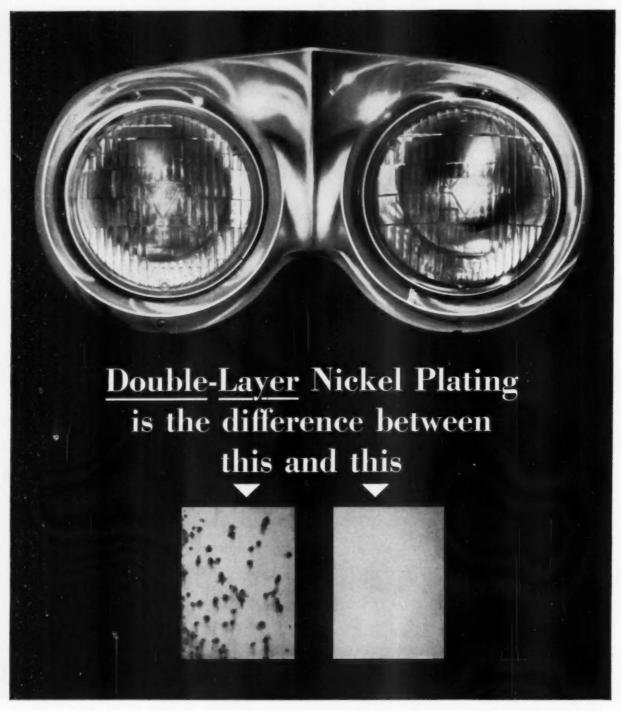


Turret Lathes • Automatic Lathes • Balancers • Superfinishers • Threading Lathes • Factory-Rebuilt Machines with New-Machine Guarantee

Circle 101 on Inquiry Card for more data

Circle 104 on Inquiry Card for more data

1



Both of these plated panels were exposed in a corrosive marine atmosphere for 18 months!

You can see how the panel on the left — plated with a Nickel-Chromium coating that is perfectly suitable for less rugged use — fared in this severe outdoor test.

But the panel on the right — coated to the same 2.0 mil thickness — retained its rich original luster!

Why? Double-Layer Nickel Plating a good thick layer of sulfur-free, semibright Nickel beneath the lustrous bright Nickel layer and the thin chromium overlay.

Remarkably durable, this combination provides outstanding resistance to corrosion, abrasion and wear . . . helps assure the mirror-bright, lasting eye appeal that satisfies today's qualityconscious customers.

For more information on the dura-

bility of decorative Nickel-Chromium plating, write for your free copy of "The Contribution of Nickel and of Chromium to the Durability of Decorative Plating."

The International Nickel Company, Inc. 67 Wall Street New York 5, N.Y.

Inco Nickel

Nickel makes plating perform better longer

AUTOMOTIVE NDUSTRIES

A CHILTON MAGAZINE . PUBLISHED SEMI-MONTHLY

SEPTEMBER 1, 1960

VOL. 123 No. 5

MACHINE TOOL AND PRODUCTION EQUIPMENT EDITION Pay"

AUTOMOTIVE PRODUCTION DEVELOPMENT SECTION . . . PAGE 69

BUILDING AMERICA'S FUTURE . . . PAGE 70

By Ludlow King, Executive Vice-President, National Machine Tool Builders' Association

In this article Mr. King tells how the automotive and machine tool industries cooperate to develop production advances.

TRENDS IN AUTOMOTIVE INDUSTRY USES OF MACHINE TOOLS . . . PAGE 71

By Joseph Geschelin, Detroit Editor

Advances and developments in the production equipment used by the automotive industries are described in a three-page article.

MAKING PRODUCTION PAY . . . PAGE 74

By Charles A. Weinert, Eastern Editor

A survey of machine tool builders by AUTOMOTIVE INDUSTRIES to develop basic data for use in planning modernization of equipment. The advantages of modern equipment are shown in reports from the builders.

MACHINE TOOL EXPOSITION SECTION . . . FAGE 79

More than 1000 American-made machine tools will be shown at The Machine Tool Exposition-1960. A total of 144 exhibitors will display their new products. Practically all of the new machines will be in operation.

PRODUCTION ENGINEERING SHOW SECTION . . . PAGE 103

The Production Engineering Show will have about 35 per cent more exhibitors and will occupy upwards of 50 per cent more space than it did in 1955. A preview of many of the exhibits is presented here.

COLISEUM MACHINERY SHOW SECTION . . . PAGE 119

The 2nd International Coliseum Machinery Show will feature the newest production equipment of foreign as well as American makers.

OTHER FEATURES

NEW TEMPEST OFFERS FOUR-CYLINDER ENGINE . . . PAGE 65

Pontiac's latest offering has transaxle mechanism with swinging axles. A V-8 engine is optional.

DESIGN OF THE SHEPPARD POWER STEERING GEAR . . . PAGE 178

Simplicity of design, integrated construction, and quick operating response are features of the Sheppard heavy-duty power steering gear. . . . continued on next page

MEMBER = National Business Publications, Inc.



AUTOMOTIVE INDUSTRIES is a consolidation of The Automotive (weekly) and the Motor Review (weekly) May, 1902; Dealer and mairman (monthly), October, 1903; the Automobile Magazine (monthative, 1907, and the Horseless Age (weekly), founded in 1835, May, I EDITORIAL EXECUTIVE OFFICES, Chestout and 56th Sts., Philadelphia 39, Pa., U. S. A. Cable address-Autoland, Philadelphia.

AUTOMOTIVE INDUSTRIES. Published semi-monthly by Chilton Company, Chestnut & 56th Sts., Phila. 39. Second Class Postage Paid at Philadelphia. Pa. Subscription price: To manufacturers in and suppliers to the automotive industries in the U. S., U. S. Postagions and Canada, \$2.00 per year; #8 for 2 years. All Others \$10.00 per year. Single copies, 75¢. Statistical Issue \$2.00 and Products Guide Issue, \$1.00, net.

AUTOMOTIVE INDUSTRIES

News Previews • • •

Tool Builders Hopeful
VW Makes Changes, Expects Sales Increase 3
ASTM Names Secretary 30
Interior Changed in '61 Studebaker Hawks
New Auto Hauler Becomes Convertible
Dual-Ghia Hardtop to Sell for \$15,000
26 Pct. Rise in Sales Is Rambler's Goal 4
Seminar to Discuss Missile Transportation 4
Experts to Report on Red Automation 4
Supply Unit Set Up at OTAC Headquarters
Dodge Trucks to Use Modified Slant Six 4
Col. Davis Named Arsenal Commander 4
Dura Purchases Page and Page 4
Towl Elected Grumman President 4
Industry Hailed on Air Conditioning 4
SAE Schedules Production Forum 4
New "Spy" Plane Disclosed by Army 49
Chevrolet Buys Plant for Parts Output 49
Air Force to Order 150 Jet Transports
Hupp Acquires Canadian Concern 50
Autolite Continues Diversification Program 5
New Rocket Engine by Bristol Siddeley 50
Wind Tunnel Aids British Research 51
Rocket Fuel Safety to Be Discussed 5
Radar Surveillance for Army Planes 5
Goodvear Producing at French Plant

Departments • • •

Calendar of Coming Events	8
Letters to the Editor	13
News of the Automotive and Aviation Industries.	
By Hugh C. Quinn and C. B. Campbell	37
Tabloid 4	18
Men in the News	53
Editorial Page. By Hartley W. Barclay	55
Industry Statistics. By Marcus Ainsworth	10
Metals. By William Boericke	32
Manufacturers' News	14
Machinery News. By Charles A. Weinert	36
Airbriefs. By R. Raymond Kay	14
Advertisers Index 20	11
Free Technical Literature	10

HARTLEY W. BARCLAY, Editor and Publisher JOHN F. PFEFFER, Assistant Publisher H. H. ROBERTS. Engineering Editor

EDITORIAL STAFF

C. B. CAMPBELL, News Editor ROBERT P. HOMER, Editorial Production Mgr. CORNELIUS J. KELLY, Assistant Editor NORMAN M LLOYD, Markets Editor MARCUS AINSWORTH, Statistical Editor HAROLD M NELSON, Specifications Editor HOWARD KOHLBRENNER, Art Director JANE LIVINGSTON, Products Guide Editor Assistants-Inza Sherburne, Linda Blum

DETROIT

Joseph Geschelin, Detroit Editor Hugh C. Quinn, Regional News Editor

PHILADELPHIA & NEW YORK Charles A. Weinert, Eastern Editor

WASHINGTON George H. Baker, Washington Editor Neil R. Regeimbal, Wash. News Editor Ralph W. Grosby, Wash. News Editor

LOS ANGELES

R. Raymond Kay, Pacific Coast Editor

LONDON
David Scott, British Correspondent

Paul Wooten, Washington Member, Editorial Board Robert Gunning, Readability Consultant

As part of its worldwide automotive and avia-tion news coverage AUTOMOTIVE INDUSTRIES is serviced by United Press International and has editorial correspondents in major United States and Foreign industrial centers.

All unsolicited and contributed articles sub-mitted without advance approval by the editors are sent entirely at the author's risk and the editors will not be responsible for safekeeping or prepaid postage return of such materials or photographs.

BUSINESS DEPARTMENT

E. H. MILLER, Advertising Mgr. JAMES CADAGAN, Circulation Mgr.
JOHN H. KOFRON, Chilton Research Dir. ALBERT N. CLARK, Marketing Mgr.

REGIONAL MANAGERS

CHICAGO—Carl A. Zehner 360 North Michigan Ave., Chicago 1, III., Phone RAndolph 6-2166

Detroit 2, Mich., Phone TRinity 3-7800

PHILADELPHIA and NEW YORK—Nelson W. Sieber, Chestnut & 56th Sts., Philadelphia 39, Pa. Phone SHerwood 8-2000; and 100 East 42nd St., New York 17, N. Y., Phone OXford 7-3400

CLEVELAND—George Kilbride 930 B. F. Keith Bldg., Cleveland 15, Ohio., Phone Superior 1-2860

Dallas 6, Tex., Phone EMerson 8-4751

SAN FRANCISCO—Frank W. McKenzie 1355 Market St., San Francisco 3, Calif., Phone UNderhill 1-

LOS ANGELES—L. H. Jackson 198 S. Alvarado St., Los Angeles 57, Calif., Phone DUnkirk 7-4337

ATLANTA—John W. Sangston 32 Peachtree St., N. E., Atlanta 3, Ga., Phone JAckson 3-6791

CHILTON (COMPANY OFFICERS AND DIRECTORS

G. C. Buzby—President
P. M. Fahrendorf, L. V. Rowlands, Robert E.
McKenna, George T. Hook—Vice Presidents
William H. Vallar—Treasurer
Maurice E. Cox, Frank P. Tighe, Evert B.
Terhune, Jr., Russell W. Case, Jr., Charles A. S.
Heinle, John H. Kofron, and George E. Cameron

Stanley Appleby-Comptroller

AUTOMOTIVE INDUSTRIES is one of the Publications Owned by CHILTON COMPANY, Executive Offices, Chestnut & S6th Sts., Philodelphia 39, Pa., U. S. A.

A Complete Brake Engineering Test Laboratory at your door

Bendix maintains a fleet of mobile brake laboratories which are available to you. These laboratories contain advanced brake testing instruments and are manned by Bendix engineers. They bring Bendix brake experience and know-how right to your doorstep.

The newest of these mobile labs, shown below, provides outstanding facilities for testing heavy-duty brakes. Latest electronic instruments observe and record temperatures, pressures and displacements in every part of brakes being tested—they take the pulse of brakes working under GCW loads up to 65,000 pounds.

Bendix designs, tests and produces more brakes than anybody else in the business. And mobile laboratory service is only one of the many advantages offered by Bendix . . . "brake headquarters of the world." For help on your brake problems, write, wire or phone our Customer Application Engineers at South Bend.



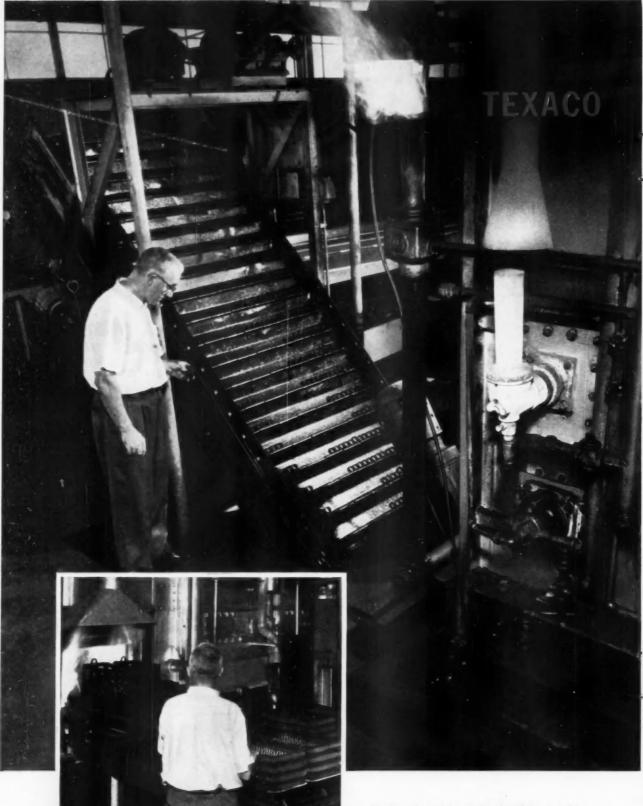


mobile lab.

Bendix PRODUCTS South Bend, IND.

Circle 106 on Inquiry Card for more data





Photos taken at Hoover Ball and Bearing Company, Ann Arbor, Mich., show (left) parts going into heat treat furnace and (above) coming out of Quenchtex bath.

QUENCHTEX OILS GIVE UNIFORM HARDENING IN THE PIECE

with improved grain structure...
no darkening of metal...longer bath life...

The proper choice of a quenching oil depends on the analysis of the steel being used and the hardness desired, among other factors.

A properly chosen quench for any given steel should remove heat fast in the high temperature range, and at a lower rate as the temperature drops through the low ranges where the metal becomes brittle and subject to stress. Because steels vary widely in analysis, Texaco offers three separate QUENCHTEX OILS—each with a different cooling curve.

The differences in cooling rate between the three QUENCHTEX OILS are functions of their composition:

- QUENCHTEX 500—a conventional or straight mineral oil of low viscosity;
- QUENCHTEX 510-a medium-speed oil blended with special additives;
- QUENCHTEX 520—a high-speed oil blended from refined paraffin base crudes plus additives.

GET THESE PROVED ADVANTAGES WITH QUENCHTEX OILS

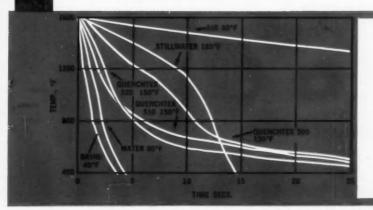
· Stability at recommended temperatures

- High resistance to evaporation loss and chemical change which occur on contact with hot metals
- Resistance to oxidation which causes contamination, oil and metal discoloration, uneven hardening
- Low drag-out and evaporation loss for longer oil life and greater economy
- Compatibility with other quenching oils. You can begin using Quenchtex now—regardless of the oil now in your tanks.

A Texaco Metalworking Specialist will be glad to take a sample of the oil you are now using for testing by Texaco's Research Laboratory. A cooling curve will be run on the sample and the compatible QUENCHTEX OIL will be recommended for makeup. For further information contact the nearest of the more than 2,300 Texaco Distributing Plants or write:

4 4 4

Texaco Inc., 135 East 42nd Street, New York 17, N. Y. AI-50



TEXACO MARQUENCH FOR HOT OIL QUENCHING

For products where full hardness combined with minimum distortion is required—gears, ball and roller bearings, bearing races, etc.—hot oil quenching with MARQUENCH can help reduce the number of rejects, increase product load capacities, and in some cases permit closer tolerances before quenching.

Chart shows cooling rates of several quenching media including QUENCHTEX 500, 510 and 520.

TEXACO
Throughout the United States

Canada · Latin America · West Africa

TERE'S WHAT WE NEAD BY

springineering

 engineering know-how and experience to handle the tough ones—where specifications call for exacting applications and close tolerances.

a complete line of wire springs and shapes...for every use in every industry.

extensive modern plant facilities, assuring prompt and dependable service for orders of any size.

THAT'S

SPRINGINEERING

UTOMATIC SPRING COILING CO.

4045 West Thorndale Avenue • Chicago 46, Illinois

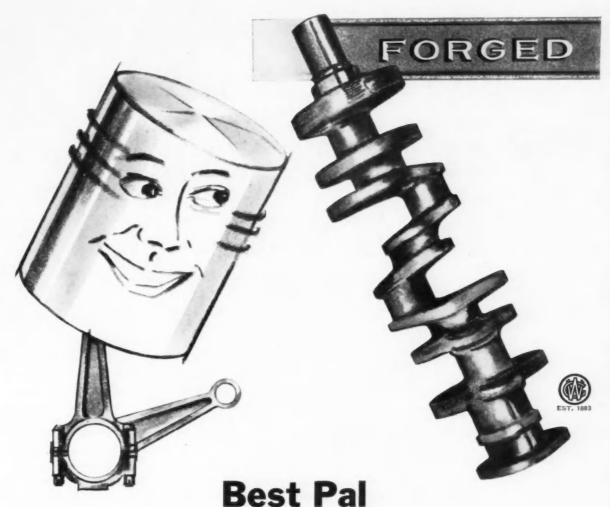
CALENDAR

OF COMING SHOWS AND MEETINGS

Machine Tool Exposition — 1960 (sponsored by National Machine Tool Builders Assn.), Chicago Sept. 6-16
Production Engineering Show, Chicago
Joint Automatic Control Conference, Boston, MassSept. 7-9
ASME Engineering Management Conference, Cambridge, Mass. Sept. 7-9
2nd Coliseum Machinery Show, Chicago
Fall Meeting, Material Handling In- stitute, Virginia Beach, Va. Sept. 12-13
Ocpt. 12-10
Farm, Construction and Industrial Machinery National Meeting, MilwaukeeSept.12-15
Steel Founders' Society of America Fall Meeting, Hot Springs, Va.
Sept. 18-20
AWS National Fall Meeting, Pitts- burgSept. 26-30
ISA, Fall Instrument-Automation Conf. & 15th Annual Meeting, NYCSept. 26-30
Iron and Steel Exposition, Cleve- landSept. 27
ASME, Rubber & Plastics Confer., Erie, PaOct. 9-12
SAE, National Aeronautic Meeting, Los AngelesOct. 10-14
Cast Bronze Bearing Institute, 1960 Annual Meeting, Asheville, N. C.
Oct. 12
Magnesium Association Annual Convention, ClevelandOct. 17-18
Lubrication Conference, ASME. ASLE, BostonOct. 17-19
42nd National Metal Exposition and Congress, PhiladelphiaOct. 17-21
SPI. "Tooling for the Plastics Industry," New York CityOct. 19
1960 Fleet Maintenance Exposition, New York CityOct. 24-27
Technical Meeting and Products Show, Spring Mfg. Assoc., Chi- cago
15th Annual Technical Exposition, American Society of Body Engi- neers, DetroitOct. 26-28
Material Handling Institute Show, Louisville, Ky

ASTME, Western Tool Show, Los AngelesNov. 14-19

SAE, International Congress and Exposition, ChicagoJan. 9-13, '61



a Piston ever had

Crankshafts have been made successfully by other methods of fabrication and have proven good enough for certain noncritical applications—but for maximum dependability of the modern, compact, high-compression, high-torque, heavy-duty engine a forged crankshaft is essential.

In a crankshaft there is no substitute for a forging, and in a forging there is no substitute for Wyman-Gordon quality and experience.

WYMAN-GORDON

FORGINGS

of Aluminum Magnesium Steel Titanium . . . and Beryllium Molybdenum Columbium and other uncommon materials

HARVEY ILLINOIS

WORCESTER MASSACHUSETTS

DETROIT MICHIGAN

GRAFTON MASSACHUSETTS LOS ANGELES CALIFORNIA PALO ALTO CALIFORNIA

FORT WORTH TEXAS

Circle 109 on Inquiry Card for more data

Circle 110 on Inquiry Card for more data-

G ways to automate

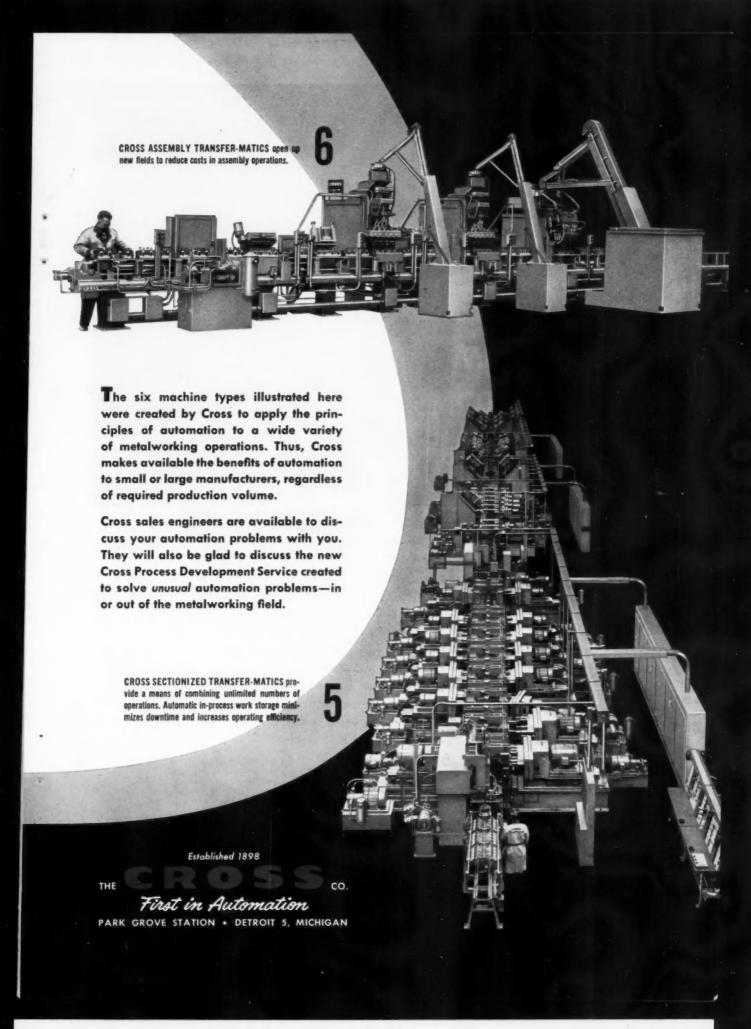
Cross automation takes many forms . . . from the simplest low production machines to complex equipment for mass production.

CROSS SINGLE STATION MACHINES exist in many configurations to combine operations.

CROSS DIAL TYPE MACHINES provide multiple station performance with minimum floor space.

CROSS TRUNNION TYPE MACHINES are compact multiple station units that permit operations on opposite sides of the part.

> CROSS PALLET TYPE TRANSFER-MATICS provide capacity for combining a large number of operations. Standard pallet fixtures handle irregularly shaped parts with maximum flexibility.





If you want high performance characteristics that do not vary from engine to engine, specify Gillett & Eaton aluminum alloy pistons. Quality control checks assure each piston to your specifications.

More than ninety years of G&E experience

goes into every piston on your order. Complete laboratory, casting and piston machining facilities assure efficient, economical production . . . keep your price competitive. Write us—we will quote on your specifications and send you complete information.

CASTING FACILITIES FOR ANY PRODUCT

Sand Casting
 Semi-permanent Mold Casting
 Permanent Mold Casting

Any castable-shape and metal—aluminum alloy, high-tensile iron, bi-metals and others. Tell us what you want.



GILLETT & EATON, Inc.

841 DOUGHTY STREET, LAKE CITY, MINNESOTA

Casting and Piston Specialists • Established 1868

Sold in Canada by Gould National Batteries of Canada, Ltd., Fort Erie, Ontario





Readers' opinions or requests for additional information on material appearing in the editorial pages of AUTOMOTIVE INDUSTRIES are invited for this column. No unsigned letters will be considered, but names will be withheld on request. Address Letters to the Editor, AUTOMOTIVE INDUSTRIES, 56th & Chestnut Sts., Philadelphia 39, Pa.

AUTOMOTIVE FASTENERS

We continue to receive from unexpected sources very wonderful comments concerning the excellent presentation of the fastener industry's relationship with its best customer in Automotive Industries.

I just can't tell you how many comments I have received by phone and letter, and by being actually stopped on the street.

Our Executive Committee was most appreciative of the really wonderful coverage, and they asked me to pass on to you the flattering comments of our Publications and Information Committee, together with their own sincere appreciation.

Frank Masterson President Industrial Fasteners Institute Cleveland, Ohio

We have just received several copies of "Engineering Advances in Automotive Fasteners" from the Industrial Fasteners Institute, of which we are a member.

We certainly appreciate this publication, and have passed the copies along to several people in our organization. We are very grateful to you for furnishing these reprints.

William M. Mill President Smith Industrial Fasteners Worcester, Mass.

ROLLS-ROYCE

Reference is made to the story regarding the all-aluminum Rolls-Royce V-8 engine which appeared in your January 15 and February 15 issues of AUTOMOTIVE INDUSTRIES under the authorship of Mr. David Scott.

If you have no objections, I propose to prepare for our Rolls-

Royce Owners' Club journal, the "Flying Lady," a resume or abstract of the referenced story.

Due credit shall be given to AUTOMOTIVE INDUSTRIES, and I feel sure that our members and owners of Rolls-Royce and Bentley cars will be appreciative of your presenting the story, and that many of them will turn to it for details after reading the summary.

C. S. Shoup Past President Rolls-Royce Owners' Club, Inc. Oak Ridge, Tenn.

No objections whatsoever—
Ed.

ARMORED VEHICLES

Your article "Armored Vehicles in America's Future," which appeared in June 15 and July 1 issues, was very interesting and timely.

If reprints are available, we would very much appreciate receiving two copies.

Daniel E. Robb
Product Design Engineer
Fire Control & Gun Mount Section
Turret & Fire Control Department
Special Military Vehicles Operations
Defense Products Group
Ford Motor Co
Dearborn, Mich

• In absence of reprints, we have sent tearsheets—Ed.

MALLEABLE

Thank you very much for the reprints of the article "Malleable Makes Big Advances" which appeared in the June 15 issue. These reprints proved to be very much in demand among our members and I am interested in receiving approximately 250 more.

Edward F. Kelly Public Relations Director Malleable Founders Society Cleveland 14, Ohio





Maintain maximum production speeds with dependable quality Southern fast-eners, made in USA by a company that has specialized in standard fasteners for 15 years.

Southern Screw's production facilities are geared to supply any quantity order from the broad line of standard fasteners that we make. Write now for current Stock List and details about Southern's free pallet system. Address Southern Screw Company, P. O. Box 1360, Statesville, North Carolina.

Manufacturing and Main Stock in Statesville, North Carolina

WAREHOUSES:

New York • Chicago • Dallas • Los Angeles

Machine Screws & Nuts • Tapping
Screws • Stove Bolts • Drive
Screws • Carriage Bolts • Continuous Threaded Studs • Wood Screws

Head styles in: Slotted, Phillips; Flat, Round, Oval, Pan, Binding, Truss, Fillister, Washer, and Heyagon.



Circle 112 on Inquiry Card for more data



NOW—A Great New
Combination for

DOUBLE
PROTECTION
Against
Corrosive Conditions
on Aluminum,
Magnesium or Zinc

(RIDITE)

CHROMATE CONVERSION COATINGS

and

IRILAC)

CLEAR PROTECTIVE COATINGS

Now, here's a fast, easy, economical way to almost double the protection against corrosion on your product. Simply follow up the IRIDITE process with a fast, easy application of IRILAC . . . and you've given your product extra protection for longer resistance to corrosive conditions, longer shelf or storage life protection from handling, and increased beauty for more attractive appearance and faster sales.

ON ALUMINUM

An IRIDITE-IRILAC finish will provide longer life for storm doors, windows, outdoor furniture, auto parts and accessories, tubing or wire goods. And, you have a choice of color finishes such as natural aluminum and golden yellow. Other colors may be obtained by an additional dye operation.

ON MAGNESIUM

IRILAC over an IRIDITE No. 15 finish increases corrosion protection, and provides resistance to finger printing and abrasion on all types of products, with color appearance ranging from light to dark brown.

ON ZINC

IRIDITE plus IRILAC gives your product longer life and brighter appearance. Color choices range from clear IRIDITE to olive drab, plus colored dye finishes.

IRIDITE is the tradename for a specialized line of chromate conversion coatings that can be applied to any non-ferrous metal by brush, dip or spray methods—at room temperatures—manually or with automatic equipment. Upon application, a thin film forms which becomes an integral part of the metal itself, and thus cannot chip, flake or special No special equipment, exhaust systems or specially trained personnel are required.

IRILAC is the tradename for a line of clear protective coatings for all metals. As safe and easy to handle as water, they may be applied by brush, dip or spray methods. No exhaust or special fire protection equipment required. Adds protection and abrasion resistance to any base metal, plated part or parts treated with electrolytic or chemical post treatments, without chemical change.

For complete technical information on IRIDITE Chromate Conversion Coatings or IRILAC Clear Protective Coatings, write for FREE TECHNICAL MANUAL. Or, see the Allied Field Engineer in your area. He's listed under "Plating Supplies" in the yellow pages.



Allied Research Products, Inc. 4004-06 EAST MONUMENT STREET . BALTIMORE 5, MARYLAND BRANCH PLANT: 400 MIDLAND AVENUE . DETROIT 3, MICHIGAN

Wost Coast Licensee for Process Chemicals: L. H. Butcher Co. a European Agent: Store Granberger, Storgaton 10, Stockholm, Swedy

Chemical and Electro chemical Processes, Anodes, Rectifiers, Equipment and Supplies for Metal Finishing IRIDITE &

Coatings

ISOBRITE

ARP ®

WAGNER



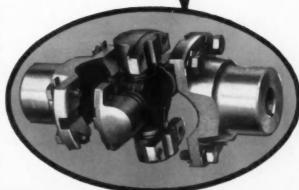
REDUCE DOWN TIME for SERVICING from HOURS to FIFTEEN **MINUTES**

MECHANICS Roller Bearing UNIVERSAL JOINTS can be removed and replaced—on the road—in 15 minutes with a wrench and hammer. Because keys and keyways are machined to fit, there is no danger of destroying the original accurate alignment and balance. This flangetype bearing assembly can be lifted out, simply by removing the cap screw bolts. Let our engineers show you how this and other exclusive MECHANICS Roller Bearing UNIVERSAL JOINT features will help give your product more competitive advantages.

MECHANICS UNIVERSAL JOINT DIVISION

Borg-Warner • 2024 Harrison Avenue, Rockford, Illinois

Export Sales: Borg-Warner International 36 So. Wabash, Chicago 3, Illinois



MECHANICS UNIVERSAL JOINTS

Roller Bearing BW



- For Cars Trucks Tractors Farm Implements Road Machinery
 - Aircraft Tanks Busses and Industrial Equipment •

Automotively speaking... AMCHEM SPEAKS YOUR LANGUAGE!



Amchem service in automotive phosphating processes goes far beyond the sale of chemicals.

For instance, the Amchem "Technical Service Report" developed over 13 years ago has been adopted as virtually a standard form among leading automotive manufacturers. This monthly report incorporates all pertinent chemical and equipment performance data in one convenient form, has manifold advantages in keeping local and district management informed of line conditions for chemical control and maintenance, produces higher levels of quality through extra vigilance in controlling chemical baths and equipment.

In the past Amchem service has achieved signifi-

cant advances in automotive prepaint finishing, among them—Deoxidine, the first corrosion-proofing treatment for use in mass production of steel automobile bodies; the first spray process for rust-proofing steel; and Granodine, the spray phosphating process that has become the accepted standard in industry.

Amchem has spent a lifetime (all 46 years of its corporate existence) providing phosphating services to the automotive field. If your requirements embrace more than phosphating chemicals alone, look to Amchem's Metal Protection Laboratories where, automotively speaking, we speak your language!



AMCHEM PRODUCTS, INC.

(formerly American Chemical Paint Co.)
AMBLER, PA.

Detroit, Mich., St. Joseph, Mo., Niles, Calif., Windsor, Ont.

Amchem, Granodine and Deoxidine are registered trademarks of Amchem Products, Inc.

Research and Development at Work

Acid clawed! Drenched in a witch's brew! Seared for hours in cauldrons of metal-devouring acids. Fantastic laboratory tests designed to engineer more safety into every Midland Brake System.





OWOSSO DIVISION TER OWOSSO, MICHIGAN



ONE OF THE "400" LARGEST AMERICAN CORPORATIONS

AIR BRAKES

AIR COMPRESSORS

CONTROLS

VACUUM POWER BRAKES

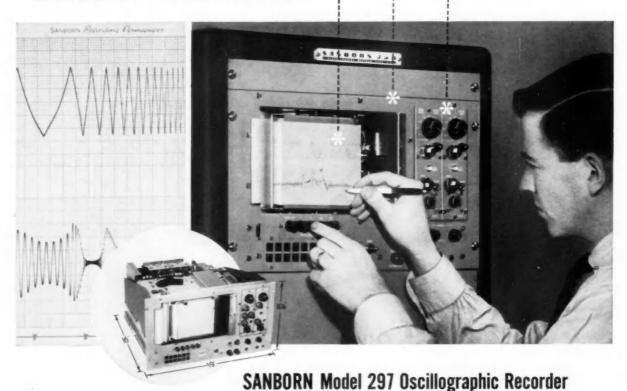
CASTINGS

CONSOLIDATED
TRANSPORTATION EQUIPMENT

THIS NEW 2-CHANNEL DIRECT WRITER...

mounts in 101/2" of rack space or in a separate portable case

interchangeable "850" Series plug-in preamplifiers for each channel



Compactness and versatility without loss in performance is the design concept for this new 2-Channel Direct-Writer from Sanborn. The Model 297 provides two complete recording channels in only 10½" of panel space, making it extremely useful as a monitoring recorder — integrated with large instrumentation settings of the second of the sec ups in data processing installations, test stands and similar applications. In its own portable case, the Model 297 will be equally useful in laboratories and field applications as a bench-top instrument.

Preamplifiers are "850" Series plug-in interchangeable units, available in Carrier, DC Coupling, Phase Sensitive Demodulator, and Low Level types. They may be used in any combination, one for each channel. An internal MOPA for carrier and chopper excitation is also available.

The basic recorder assembly houses a preamplifier power supply, transistorized power-amplifier power supply, and two transistorized current-feedback power amplifiers with built-in electrical limiters that provide damping at all times. The entire unit has built-in forced filtered air cooling.

The recording mechanism has rugged, enclosed galvanometers with velocity feedback damping . . . 4 different chart speeds selected by push buttons . . . timer/marker stylus with 1 second timer . . approximately 6 inches of visible chart with immediately visible traces made by heated stylus. The electrical and me-

chanical specifications in combination with the many "big system" operating features make the compact Model 297 one of the most useful, reliable 2-channel direct writers available.

Contact the Sanborn Sales-Engineering representative nearest you or write the main office in Waltham for com-plete information and application assistance. Sales-Engineering representatives are located in principal cities throughout the United States, Canada and foreign

Model 297 2-Channel Recording System Specifications (Less plug-in preamps)

Sensitivity: 0.1 volt/mm nominal

Frequency Response: DC to 125 cps within 3 db, 10 mm peak-to-peak amplitude Gain Stability: Better than ½% from 20°C to 40°C or line voltage change from 103 to 127 volts

Linearity: Max. non-linearity is 0.2 mm Electrical Limiting: Approximately ±115% of full scale Chart Speeds: 1, 5, 20, and 100 mm/sec. by mechanical push button

Dimensions: 101/2" high x 16" deep x 19" wide Paper Take-up: electrically operated

(Specifications are subject to change without notice.)

SANBORN SAD COMPANY

Industrial Division

175 Wyman Street Waltham 54, Massachusetts

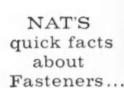


Tapping Heads
10 and 11
Operational

On this 23 station Greenlee automatic transfer machine being built for a prominent truck maker to machine cylinder heads, GREENFIELD taps were on the job way back here during test runs on the assembly floor.

When buying machine tools, it's smart to choose a reliable tool supplier to work along with your machine builder. Then you'll know on delivery that your tools as well as the machine are truly operational.

GREENFIELD TAP & DIE GREENFIELD, MASS.

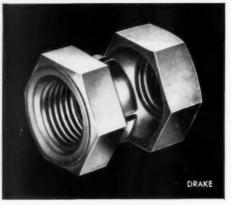












Looking for the right lock nut? Put these four high on your check list

By taking an early look at these National all-metal lock nuts, you may often be able to make quick work of finding the locking member that best meets the requirement of your particular job.

Once over lightly, here are the advantages they offer you.

MARSDEN-For minimum cost and average conditions. Free-running until seated. One-piece, fully re-usable.

HUGLOCK-For use under adverse conditions. Locks without seating. Onepiece design, and fully re-usable.

CONELOK-For applications requiring high-fatigue life, as assured by closed stress paths in Conelok's locking sections. Locks without seating. One-piece design, and fully re-usable.

DRAKE-For use under severe stress, shock or vibration. Free-running until seated, or can be locked at any point by using two wrenches. Two-piece design, and fully re-usable.

Take a good look at all four, and at the advantages they may be able to offer in your product assemblies. You may not be thinking of an application right now, but get the literature* and keep it handy in your files, just in case.

*There's a folder on the Conelok, and a booklet on the others. Write for your copies.





The National Screw & Mfg. Company · Cleveland 4, Ohio

California Division, The National Screw & Mfg. Company • 3423 South Garfield Avenue, Los Angeles 22, California



NEW ONE-OF-A-KIND MICROGRAPH

draws pictures for bearing research

This greatly magnified stylus is drawing a picture of the microscopic imperfections in a bearing raceway . . . measuring each one to within a few millionths of an inch. The picture-on-tape which comes out of this specially modified micrological instrument is an important tool in BCA's research on ball bearing performance.

This is just one of the precision instruments in the Temperature-Humidity-Controlled Instrumentation Room which is the center of BCA research on bearings. The result of this program is revealed in on-the-job performance of BCA bearings. They roll dependably under heavy loads and all kinds of adverse conditions.

New testing facilities at the BCA laboratories also include specially designed equipment, often identical with equipment in customers' plants. Here, BCA bearings are tested to exceed customer specifications under the exact operating conditions experienced by the customer!

BCA ball bearings are standard original equipment . . . replacement, too . . . for nearly every kind of industry. For example, automotive, earth moving, agricultural and machine tools. The wide line of ball bearing sizes and types, plus BCA's research and extensive new testing facilities, pays off for bearing users. Consider the performance record of BCA ball bearings the next time you purchase or specify bearings. For more information, or for assistance with bearings problems, contact Bearings Company of America, Division of Federal-Mogul-Bower Bearings, Inc., Lancaster, Pa.

BEARINGS COMPANY
OF AMERICA



DIVISION OF
FEDERAL-MOGUL-BOWER
BEARINGS, INC.



Photo courtesy International Harvester

How R/M helped develop unusual wet friction application for International Harvester

Can you imagine the friction problem created in braking and turning a crawler tractor like this?

That's the problem International Harvester engineers faced in 1948 when they designed the TD-24 crawler tractor. Plans called for a wet friction application in the steering system. Wet friction was pretty new in construction equipment 12 years ago. So it was natural that I.H. called on Raybestos-Manhattan's friction "know-how."

Woven asbestos

R/M friction specialists tackled the problem and came up with an unusual shaped woven asbestos brake lining material. It has shown phenomenal resistance to wear under rugged service conditions. In fact, it was so successful that International Harvester continues to use it in the Planet Power steering of such new tractors as the 22 ton, 230 hp TD-25 shown above.

Service, quality, competitive prices

Only R/M manufactures all types of friction materials—your assurance of sound, unbiased recommendations on the material best for your needs. So next time you have a friction problem, why not see what R/M can do. Large field engineering staff and extensive laboratory facilities are all set to work for you. As one customer put it, "We get this extra service, yet prices are competitive; quality is uniformly high." Call us—

an R/M sales engineer can be at your desk within 24 hours.

Want helpful engineering data on friction materials? Send now for R/M Bulletin 501—no obligation.





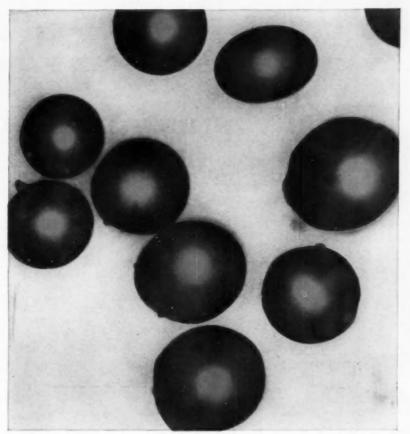
R/M weven asbestes brake linings for Planet Power steering—an independent two speed power-shift planetary transmission on each side of bevel gear and pinion. Each controlled by three discs for low and high ranges, pivot brake. Hydraulic actuated brake shoe, lined with R/M material, stops selected discs; allows power to flow to the crawler track in that speed range. Splash and pressure lubricated; oil helps cool.



RAYBESTOS-MANHATTAN, INC.

EQUIPMENT SALES DIVISION: Bridgeport, Conn. • Chicago 31 • Cieveland 16 • Detroit 2 • Los Angeles 58

30 MILLION OF THESE JET-FORMED SPHERES IN EVERY INCH OF BEARING SURFACE!



IFT PROCESS BLASTS MOLTEN ALLOY INTO UNIFORM PARTICLES ... so small that thirty million will form a thin layer only one inch square! This sintered layer is the bearing surface of Federal-Mogul

sleeve bearings.

Molten copper-lead, alloyed to exact specifications, is poured into a special inert-atmosphere reaction crucible. Here it's blasted by a high-speed fluid jet to form the dense powder shown at left.

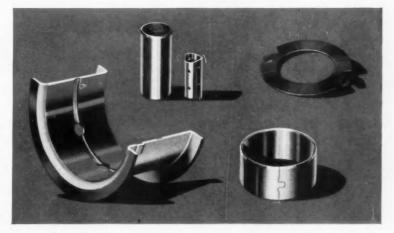
Because of the uniform particle size of this powder, the bearing surface of each F-M copper-lead sleeve bearing has precisely the same alloy composition and high adhesion to the steel backing as every other F-M bearing of the same alloy type!

YOU CAN SEE THE CONSISTENT SIZE

in the photomicrograph. What you can't see is the consistent alloy composition which produces uniform bearing properties and performance in any alloy type.

Federal-Mogul makes engine bearings for every condition of speed and load. You can select from among five different sintered copper-lead alloys, all permanently bonded to precision-formed steel backing. Our Engineering Department is available to you for consultation or recommendations on bearing design and application. For more information, write Federal-

Mogul Division, 11037 Shoemaker, Detroit 13, Michigan.



A COMPLETE LINE! Steel backed bearings with a selection of many different alloys for virtually any bearing application—Plain and bimetal bushings in bronze, steel or aluminum. Precision thrust washers in solid bronze, or sintered alloys on steel (one or both faces). Rolled split spacer tubes in steel, aluminum or stainless.

FEDERAL-MOGUL

sleeve bearings bushings-spacers thrust washers DIVISION OF FEDERAL-MOGUL-BOWER BEARINGS, INC.

Du Pont Plastics...



for automatic lubricating system solves tough problems by using ZYTEL® and DELRIN®

A greatly improved central automatic lubricator using many parts of Du Pont ZYTEL nylon resin and Du Pont DELRIN acetal resin has won a First Award in Materials in Design Engineering's 4th Annual Competition. Because the system was designed for use on vehicles, the materials used had to meet a wide range of exacting conditions. The lubricator was designed to operate in temperatures ranging from -25°F. to 225°F., at pressures ranging from 40 psi to 90 psi and in contact with mineral lubricants.
With these requirements in mind, the designers selected Du Pont ZYTEL nylon resins for the three main parts of the reservoir assembly, for the manifold and for the connecting line between pump and manifold. The variety of compositions of ZYTEL offers designers wide latitude in selecting the resin with the best balance of properties for each specific job. By careful selection, the parts of ZYTEL in the Walker Lubricator provide the toughness, corrosion resistance and flexibility required under the conditions of use . . . and are economical.
For the pump housing, new DELRIN acetal resin was chosen. The rigid molding has excellent dimensional stability and a low coefficient of friction-giving long plunger life. The housing of DELRIN is resistant to mineral lubricants and has an excellent fatigue life in oil. An attractive cost saving was also attained: parts of DELRIN could be molded to finished dimensions on a mass-production basis, and required no machining.

This is another example of the performance and cost advantages made possible by Du Pont's versatile engineering materials for the auto industry. Find out more about properties and applications relating to your field by mailing the coupon below.

ALATHON* - DELRIN* - LUCITE* - ZYTEL*
POLYETHYLERE RESIRS ACETAL RESIRS ACRYLIC RESIRS NYLON RESIRS

Du Pont's versatile engineering materials



BETTER THINGS FOR BETTER LIVING ... THROUGH CHEMISTRY

E. I. du Pont de Advertising Dept Nemours Buildin		507Z			
I am interested in DELRIN® ZYTEL®					
Name					
Street					
Company					
C:t	Zone	State			

Spray, dip, or flow coating . . .

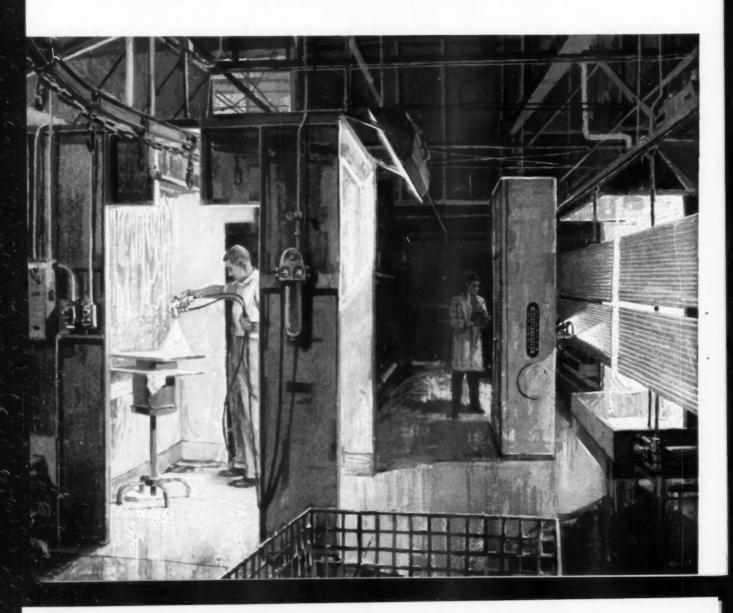
DeVilbiss total

can help determine the best method for you

Large job or small, you get an unbiased recommendation from DeVilbiss for the coating method that will work best for you. For, DeVilbiss is the only company that manufactures a complete line of coating equipment—from individual spray guns to engineered finishing systems.

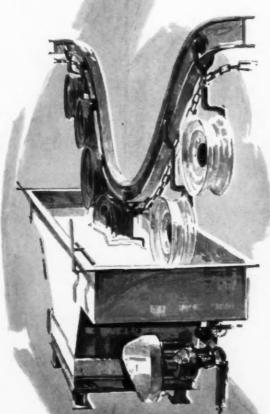
Trained engineers provide total service from initial planning to complete training of operational personnel. Furthermore, our customer research laboratory will run comparison tests of your products for actual results that reveal what method is best for you. Or DeVilbiss engineers will suggest ways to make your present system more efficient with minimum changes, and onthe-job operator training.

See how DeVilbiss total service can help you. Just contact our nearest representative or write: The DeVilbiss Company, Toledo 1, Ohio. Also Barrie, Ontario; São Paulo, Brazil; and London, England. Branch offices in principal cities.



service

DEVILBISS



Dip coating Continuous process or batch type, with scientific vapor and viscosity controls to ensure uniform finishes

Flow coating

Spray coating

Saves man power, floor space in prime- or single-coat applications

DeVilbiss manual and automatic equipment coats products of any size or shape quickly, economically

Circle 119 on Inquiry Card for more data



THE AMPLEXOLOGIST



AUTOMOTIVE INDUSTRIES, September 1, 1960



The Amplexologist is sometimes detected about to pocket a part in a prospective customer's plant. Especially a part being machined from a rough casting or hogged out of steel. Just the sight of it starts wheels whirling in the Amplexologist's head.

Why all the machining? Is this scrap necessary? Could we make the part out of powder metal? Eliminate machining costs. Eliminate scrap. Deliver a finished precision part for the price of a rough casting. Less, maybe?

Well! Thoughts like these are enough to make the Amplexologist forget his mother's maiden name. No wonder it sometimes takes a pointed stare to remind him to ask permission to pick up the part and take it back to the office and figure precisely how to make it better and cheaper through advanced powder metallurgy.

Customers usually forgive him the sins of his enthusiasm. It has saved them thousands of dollars. We can afford to forgive him, too. He has helped make us the world's largest, most experienced producer of powder metal parts. He is the reason manufacturers say: When it comes to powder metallurgy—Amplex has the answer.



FOR THE BENEFIT OF SKEPTICS ...

The part shown is a combination gear and compound cam. Formerly, it was an 8-piece assembly: fibre gear, steel flange, horizontal steel cam, vertical steel cam, four steel screws. Then the Amplexologist went to work. Today, the part is produced by powder metallurgy as a single unit—a finished precision part that requires no machining.

Cost reduction: about 90%. What's more, the powder metal part provides longer wear, quieter operation.

Photograph permission RCA.



SEND COUPON . . . If you'd like to talk over your product with the Amplexologist. Don't hesitate. He's always happy to get out of the office.

AMPLEX

DIVISION CHRYSLER CORP.



AMPLEX DIVISION • CHRYSLER CORP. • Dept. A-9
P.O. Box 2718 • DETROIT 31, MICH.

Please have the Amplexologist call to look into the possibility of using powder metal parts in our product.

NAME.

COMPANY

ADDRESS.

CITY

STATE

PRODUCT



Proving ground for AUTOMOTIVE CHEMICALS

At Dow, where the test tube often serves as test track for automotive fluids, there is a dedicated group of men who are exceedingly car conscious. These men of Dow's Automotive Chemicals Laboratories—car buffs in their own right—work together enthusiastically with automotive engineers on a wide range of developmental applications, both current and future. The results of this natural cooperation may take the form of a better brake fluid, a safer metal cleaner, or a synthetic lubricant . . . one with properties for "years ahead" applications such as the new polyphenyl ethers . . .

NEW LUBRICANTS SHRUG OFF OXIDATION, RADIATION AT HIGH TEMPERATURES

Polyphenyl ethers exhibit marked improvements in lubricating properties and the ability to "take it" under adverse conditions. They're the result of a long range research program on synthetic lubricants at Dow . . . one of primary interest to forward-thinking automotive engineers.

Continuous research on synthetic lubricants in Dow's Automotive Chemicals Laboratories has spotlighted the polyphenyl ethers. These chemical materials have exceptional lubricating properties and excellent stability in the presence of oxidation, radiation and high heat.

Their lubricity is comparable to the diester lubricants; in the Shell 4-Ball Wear Test, for example, the scar diameter is 0.9 mm. when operating at 600 rpm and 400°F for one hour at a loading of 50 kg. Polyphenyl ethers are resistant to radiation—changes in viscosity are minor after absorption of 1 x 10¹¹ ergs per gram. In a non-oxidizing atmosphere, some polyphenyl ethers withstand 800°F for about 100 hours. In an oxidizing environment polyphenyl ethers can be used for long periods of time at temperatures up to 600°F. Low temperature use is currently limited to 30°F.

Dow is currently working with industry to perfect practical applications. The high resistance to radiation of polyphenyl ethers suggests their use in nuclear-powered aircraft and surface vehicles.

This research and developmental work is part of an over-all program on syn-



Synthetic lubricants pass lubricity exam for power steering pumps.

thetic lubricants of all types, including the large and versatile polyglycol family. The polyglycols are characterized by many desirable lubricating properties. They have a high natural viscosity index, are non-carbonizing, and display improved oxidation and shear stability, sludge and varnish resistance. Polyglycol lubricants are used today in such

diverse applications as crankcases, gas turbine engines, and hydraulic fluids.

V. I. improver research shifts into high

Although viscosity index improvers are young as additives go, they're doing a man-sized job in many lubricating oils. Continuous research on them is being carried out at Dow-in fact, it's currently being speeded up in Dow's Automotive Chemicals Laboratories. Why? Because the tasks V.I. improvers are asked to perform have rapidly multiplied. Present "extra-curricular" jobs as pour point depressants and detergents are varied and complex; yet vastly improved properties will be expected of the V.I. improvers of a few years from now.

As an example of the specialized, modern research equipment utilized in this work: Dow has developed an apparatus that simulates 20,000 miles of road testing in just one hour's time! Similar testing devices are now being perfected in the lab.

That settles it!

When plant engineers have an industrial waste problem, they often find the answer in Dow's family of flocculating agents. Separan® NP10, for example, speeds settling rates of solids in solution and improves clarity. It also does an outstanding job in water reatment and in most types of processing operations.

Polyols for every purpose

Dow offers industry "the world's widest line of polyols." These specialized chemicals are used in a broad range of fluids of interest to automotive engineers: brake and power steering fluids, synthetic lubricants and transmission fluids, coolants, antifreezes and hydraulic fluids.

Some of the newest of the automotive materials made from Dow polyols are the urethane foams used as seat cushioning material. Dow provides foam manufacturers with Voranol*—special resin-grade polyglycols tailored to meet the exacting requirements of the flexible foam industry. Because Dow is *basic* in polyols, it can provide custom-made materials best suited for any particular customer application. There's practically no limit to the kinds of polyols Dow can produce!

From Dow operations like this come the "world's widest line of polyols."





Shear-testing V.I. improvers under "road test" conditions.



Waste solids in solution settle out quickly with Separan NP10.

WANTED: TOUGH PROBLEMS!

The men of the Dow Automotive Chemicals Laboratories are leading with their chins. They welcome any technical chemical or chemical engineering problem—on current or future applications—concerning automotive chemicals. Your inquiry will receive prompt attention by our research staff. Contact the Dow sales office near you or write to THE DOW CHEMICAL COMPANY, Midland, Michigan, Chemicals Merchandising Dept. 403T9-1.

See "The Dow Hour of Great Mysteries" on TV.

THE DOW CHEMICAL COMPANY
Midland, Michigan

FROM AMERICA'S LEADING PRODUCER OF PISTON RINGS... PERFECT CIRCLE PRECISION CASTINGS

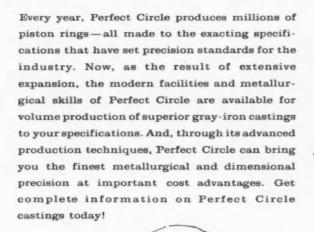
STATE OF THE PARTY OF THE PARTY

STACK-MOLD CASTING

Molds of carefully-controlled green sand are made from the pattern plate, and stacked for pouring. In the example shown above after shake-out, the castings are 6-up in a stack 20 molds deep. Typical castings produced by this Perfect Circle process include piston rings, thrust plates, valve lifter facings and piston groove inserts.



Mass-produced to the highest quality standards





Name

Title

Company

Address

WHIRLCAST CYLINDRICAL FORMS

Hot metal is poured into permanent molds, and then spun at high speeds to create machineable cylindrical gray-iron castings of uniform dimension and hardness, with microstructure controlled to exacting specifications. PC Whirlcast products are offered in a wide range of sizes and materials, all precision-made for fast, economical machining with minimum stock removal.

PERFECT OCIRCLE

PISTON RINGS . PRECISION CASTINGS POWER SERVICE PRODUCTS . SPEEDOSTAT HAGERSTOWN, INDIANA . DON MILLS, ONTARIO, CANADA **ACTIVATION:**



walks alone.

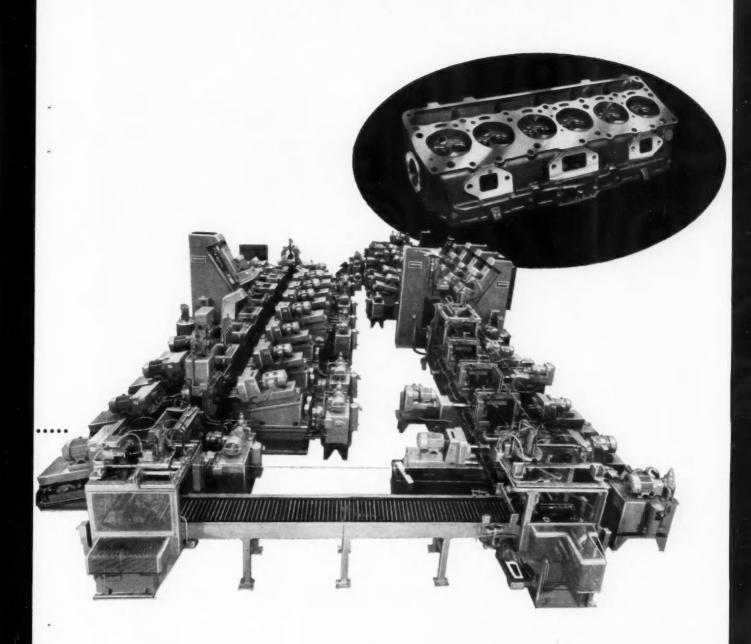
Already assembled, tooled and running test parts! That's the latest word from American Motors Corporation, owner of Buhr's Baby.

The "Baby," as nearly everyone knows, is a lift-and-carry, part-through transfer—the first major transfer machine built to the new Special Machine Tool Standards. It was designed to perform 323 precision operations on cylinder heads for 1961 Rambler engines at the AMC plant in Kenosha, Wisconsin. Capacity at 100% efficiency is 120 pieces per hour.

And we are proud to announce that while the "Baby" was under construction, we started work on other Buhr Economatics to be built to the new Special Machine Tool Standards. To date, Buhr has built or is building its twenty-eighth additional "SMTS" machine.



SEE SMTS ECONOMATICS . BOOTH 1440 MACHINE TOOL EXPOSITION





BUHR MACHINE TOOL COMPANY

ANN ARBOR, MICHIGAN

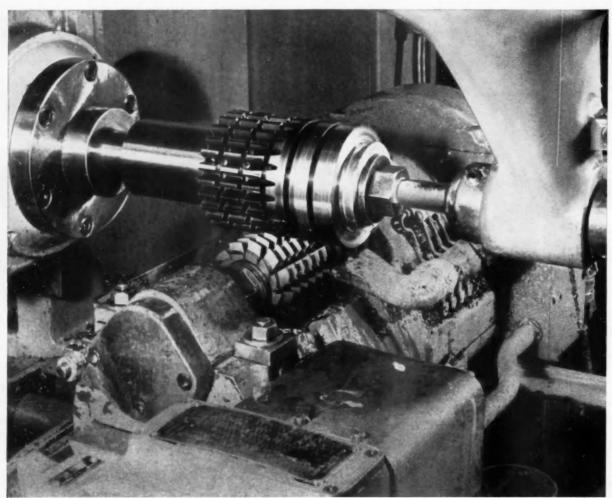


Photo courtesy Chelsea Products, Inc.

Aristoloy Leaded Steel provides free machining for Chelsea Products, Inc.

Steel for gears used in power take-off assemblies must have uniform hard surface, high tensile strength and yet machine freely. Aristoloy Leaded* users have benefited from these qualities.

Chelsea finds more gears can be cut from leaded Aristoloy before the hob needs sharpening. Production can be improved and speeds and feeds increased over non-leaded steel. Strength and hardness are not affected and the finished part reveals no detectable difference in physical properties from steel previously used.

For complete information call the Copperweld representative in your nearest large city...or write today for New Products & Facilities Catalog.



*Inland Ledloy License



ARISTOLOY STEEL DIVISION . 4025 Mahoning Ave., Warren, Ohio . EXPORT: Copperweld Steel International Co., 225 Broadway, New York 7, N. Y.

NEWS

Vol. 123, No. 5

Sept. 1, 1960

Tool Builders Hopeful

Big Changes Due in Next Few Years

By Hugh C. Quinn, Detroit Regional Editor, and C. B. Campbell, News Editor

Now that 1961 automobile production is under way, machine tool builders are turning their attention toward future models. There is an air of anticipation, because the automobile companies are planning some big product changes in the next few years, but more than a few machine tool builders are holding their enthusiasm in check. The reason is uncertainty about whether the auto companies will order new equipment or merely rebuild old machinery.

New groups of engines, new bodies, new transmissions and even completely new cars indicate some kind of a tooling program is in the offing. Some orders have been placed, some are due to be let within the next few months, and some have not yet been put out, but the new 1961 models are incorporating some really major product changes that did not generate a lot of new machine tools.

The three new GM compacts, for instance, are being built mainly on reworked equipment. Pontiac will build the Tempest four-cylinder engine on the same basic line that the V-8 runs down, and the body

will be worked into the regular assembly line. In Flint, Buick has put in new lines for both engine manufacturing and body assembly. But the equipment on these lines is practically all rebuilt.

Chrysler has no new equipment to speak of for '61 production.

American Motors and Studebaker-Packard each have new transfer machines for engine manufacturing, and Studebaker sent three transfer machines once used by Packard back to manufacturers for rebuilding.

Ford Motor Co.'s tooling program for '61 models extended to every division, and included changes in several engines, automatic transmissions, axles and other components, to say nothing of all new bodies for Ford, Mercury, Thunderbird and Lincoln. But Ford held its capital outlay to a minimum by rebuilding existing machinery in most instances.

For example, two rebuilt inline

\$40,000 ALFA ROMEO SPORTS COUPE SHOWN IN U. S.



Handcrafted model by Pinanfarina has Plexiglass top which allows complete visibility and shields occupants from sun's heat. The coupe has six-cylinder engine of 260 hp and is said to have top speed of 170 mph.

1961 SIX-CYLINDER VAUXHALL



Larger and entirely new engine of 162 cu in, displacement develops 113 hp at 4800 rpm. Bore and stroke are both $3\frac{1}{4}$ in, and compression ratio is 8.1 to 1. The axle ratio is increased to 3.9. Gearbox ratios are unchanged.

transfer machines, 26 and 16 stations, for an engine intake manifold, or a rebuilt 45-station machine for pistons, or a rebuilt 32-station transfer machine for rear axles. Or other rebuilt equipment for exahust manifold, crankshaft and pin bearing.

Heavy Spending Seen

But product changes, and entirely new products, in 1962 and 1963 will require heavy machine tool expenditures, for both new and rebuilt equipment. Much of the program centers around new aluminum engines (See AI Dec. 15, 1959).

Orders have been placed for an aluminum V-8 for Oldsmobile, and some orders have been placed for Ford's new V-8. Both of these engines could be in production by the end of 1961 as '62 products. Buick and Pontiac have not released tooling for their new V-8 engines, which are planned for '63.

GM also is planning a new aluminum four and an aluminum six. At one point, both engines were slated to be built in Flint, but the program has been split and the tooling cost cut in half. The four reportedly will be built in Flint, while the six has been switched to Tonawanda, N. Y.

Smaller Compact Due?

The four-cylinder engine, incidentally, might be planned for use on a small compact, something in the four-passenger category. Tooling for these two engines is scheduled for delivery by late spring of 1961.

GM's Detroit transmission is expected to release some new tooling orders before the end of December. This would be for the long-awaited transaxle, put off for several years.

Chrysler already has released the order for an automatic transmission case transfer line to be installed in Kokomo.

GM's new four-cylinder engine program indicates parallel activity in transmission and drive programs, with tooling yet to come.

Ford Moves Ahead

Ford, meanwhile, is moving right ahead with its small compact car (See AI Dec. 15, 1959; May 1, 1960), with tooling orders already shaping up. Bulk of the tooling orders are expected to be signed during September.

The engine-transmission-drive package—it's a front-wheel drive car to be made in Cologne, Germany, with a large share of the tooling done overseas. But at least one major transfer line might be built in the U. S., since Ford is pushing for early introduction of this new car at the end of 1962 as a '63 model.

Ford also has begun to release tooling for its trimmed-down 1962 Ford and Mercury standard cars, which will be lighter (about 3000 lb curb weight) and shorter (wheelbase 116 in., give or take an inch) than '61 models. A new six-cylinder engine is indicated here.

Chrysler also will scale down its volume Plymouth and Dart lines, calling for some new tooling.

VW Makes Changes, Expects Sales Increase

Volkswagen, strongest of the imports, is making a few changes in its 1961 model, but the only change in appearance will be a new door lock. All the other changes, including a new 40 hp engine, are under the sheet metal.

VW confidently expects to raise its sales 25 per cent during 1961, a "reverse trend," with an import car staving off the competition of small domestics. Dr. C. H. Hahn, general manager of Volkswagen of America, said at a recent preview of the new model in Detroit, that he "can safely predict" that sales will total 150,000 by the end of 1960. U. S. registrations during the first six months of the year were 41 per cent ahead of last year.

The new engine, still a horizontally opposed four, has a higher compression ratio (up from 6.6 to 7.0), higher horsepower (up from 36 at 3700 rpm to 40 at 3900 rpm), and greater torque (up from 56 at 2000 rpm to 64 at 2400 rpm).

Other changes include addition of a fully-synchronized transmission higher gear ratios, 65 per cent increase in luggage space with a reshaped gas tank, automatic wind shield washer, and twin padded sun visors.

ASTM Names Secretary

Raymond E. Hess, associate executive secretary, has been named acting executive secretary of the American Society for Testing Metals. Robert J. Painter, executive secretary since 1952, will be a consultant to Mr. Hess and will continue as ASTM treasurer.



1961 Studebaker Hawk Features Interior Changes

Interiors Changed In Studebaker Hawks

Unchanged in styling, the 1961 Studebaker Hawk offers some intresting mechanical features as well as changes in interior treatment. The 289-cu. in. V-8 supplied last year, together with a four-barrel carburetor version of this engine, remain the same. Dual exhaust is standard. Hawks for California delivery will be equipped with the closed crankcase ventilation system. This will be available on special order for other customers as well.

Interiors have been given new treatment and have bucket type seats as standard equipment. A new type of steering wheel as well as changes in the inner door panel trim further enchance interiors. Padded instrument panels are standard.

The Hawks offer a variety of transmission options. These include the standard heavy-duty manual shift transmission, overdrive, or automatic transmission. In addition, there is a new four-speed transmission supplied with straight-stick floor shift. Other items include a 10½-in. clutch and

heavy duty radiator. A wide choice of axle ratios is available to handle any kind of operating conditions.

Optional items include power brakes, power steering, air conditioning, the "limited-slip" differential, and automatic hill holder with conventional or overdrive transmissions.

Bonded brake linings are standard and increased lining area promises an increase of some 75 per cent in lining life. Finned, weather-seal brake drums are standard.

Moldings for the windshield, windows, and on fenders above the wheels are of chromium-plated stainless steel. Exclusive Hawk options are tachometers and deck-lid mounted radio antenna.

Interiors come in a variety of fabric and vinyl upholstery color schemes. A distinctive feature is a new fabric with the Hawk insignia woven into the pattern.

SAE Unit Names Lenz

Robert E. Lenz is new chairman of the Buffalo Section, Society of Automotive Engineers. He is chief process engineer for the Fedders Corp.

New Auto Hauler Becomes Convertible

A convertible automobile-hauling van is the latest thing in convertibles.

After delivering its autos, the new vehicle has a mechanism whereby it can be converted into a conventional freight trailer. Instead of returning empty, the trailer is equipped to bring back a payload.

The all-purpose trailer will be manufactured by Dorsey Trailer Co. The Dual-Evans Corp., of Plymouth, Mich., designed and will market the vehicle.

Dual-Evans says the new trailers can be converted from auto haulers to freight carriers in less than 10 minutes by moving the runners for the second tier of cars up to the van's ceiling and folding the bottom runners on the trailer's floor.

Dual-Ghia Hardtop To Sell for \$15,000

It may not be an accurate indicator of a trend, but the price of the Dual-Ghia hardtop is \$15,000—twice the price of the original Dual-Ghia convertible brought out in 1957.

E. A. Casaroll, president of Dual-Ghia Motors Corp. in Detroit, said production schedules for the new hardtop call for one a week. About half will be sold in the U. S., half in Europe.

Mr. Casaroll, who used Chrysler engine and components in the Dual-Ghia, said he is checking the possibility of a smaller car built around Valiant components, and priced around \$4600.

NEWS

CONTINUED

26 Pct. Rise in Sales Rambler's '61 Goal

American Motors is undaunted by the wave of compacts that swept over the United States this year, and the second wave due to come this fall. AMC's sales goal for the 1961 model year is 550,000 units, or 26 per cent higher than what the company expects to do this year.

Roy Abernethy, vice president of automotive distribution and marketing, said Rambler sales for the current fiscal year, which ends Sept. 30, should hit 450,000. A year ago sales totaled 363,893.

AMC is not sitting by and watching these waves roll in. For 1961, there is a new styling for the 117 in. wheelbase Ambassador, a new series name—Classic—for the 108 in. wheelbase six and V-8 models, and a complete rework of the 100-in. wheelbase American.

The Ambassador comes out with more distinction, particularly in the front end, to set it apart from the other Ramblers. The American comes out shorter than the current model, with a convertible. The Classic gets a new six-cylinder engine. Ceramic coated mufflers are standard on all Ramblers for '61.

AMC is adding more facilities in Wisconsin to be ready for the new year. Roy D. Chapin, Jr., executive vice president of the Automotive Div., revealed the company has long-range plans for additional facilities that will cost more than \$11 million. Work on this will get under way during the coming year.

Chapin told a national press preview of the new Rambler line in August that capacity is now over the 600,000 a year mark. The company recently completed a \$43 million expansion program in Kenosha, Wis.

At the new model preview, George Romney, AMC president, made another prediction. He said that by the end of 1963, compacts will be taking two out of every three sales, or even three out of four.

Seminar to Discuss Missile Transportation

A joint industry-military seminar to discuss problems of domestic transportation of missiles, missile components and other items of oversize or hazardous nature will be held at Ft. Bliss, Tex., Sept. 20-23.

The seminar, which will be conducted by the Military Traffic Management Agency, will bring together some 300 industry and military leaders and representatives of government regulatory bodies.

Discussions will deal with transportation of missiles and associated ground support equipment as well as with the satellite programs of the military services which require special handling because of hazardous qualities, size, weight or sensitivity.

Also on the seminar agenda will be transportation-related discussions on warheads, liquid and solid propellants.

Experts to Report On Red Automation

A team of experts, recently returned from the Soviet Union, will report on Russian automation at the Joint Automatic Control Conference at Cambridge, Mass., Sept.

The meeting is sponsored by the American Society of Mechanical Engineers in cooperation with the Institute of Radio Engineers, American Institute of Electrical Engineers, Instrument Society of America, and American Institute of Chemical Engineers.

Supply Unit Set Up At OTAC Headquarters

Secretary of the Army Wilber M. Brucker has announced establishment of the Military Automotive Supply Agency at the Ordnance Tank-Automotive Command in Detroit.

Establishment of the agency at the Ordnance Tank-Automotive Command will provide integrated supply management and procurement of military automotive supplies for all military services.

FIRST TEST OF 'BLUEBIRD'



English racing driver Donald Campbell tests car designed to travel 500 mph with which he hopes to break world land speed record at Bonneville Salt Flats. Electronic monitors give readings of strain, pressures and temperatures from 23 parts of racer and radio them back to a base receiver.

Another new development using

B.F. Goodrich Chemical raw materials



ULOK Brand Cube-Type Filters, developed by Union Carbide Development Company, a Division of Union Carbide Corporation, New York, N. Y., offer the face area of a 30" x 30" air filter in the frontal area of a standard size filter, 20" x 20". Non-woven material is Dynel modacrylic fiber bound with Geon vinyl latex by Fiber Bond Corporation, Chicago, Illinois. B. F. Goodrich Chemical Company supplies the Geon vinyl latex.

New, cube-shaped air filters use non-woven made with Geon

The unusual shape of this new replacement air filter is planned to take advantage of a fibrous filter medium of uniform density—a non-woven construction made with Geon vinyl latex as a binder. The cube shape presents more filtering surface to the air stream, providing far higher efficiency over far longer life.

The filter design demonstrates how the unusual balanced physical properties of Geon latex as a binder can pay off. Geon is responsible for the resilience and strength in the batt, allowing the material to be cut, sewed, and formed into the required shape while still maintaining its 2" loft.

Here's another example of the way that versatile Geon vinyl can help to improve a product or open new markets. For more information about Geon and the many different ways you can use it, write Dept. GT - 5, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, O.



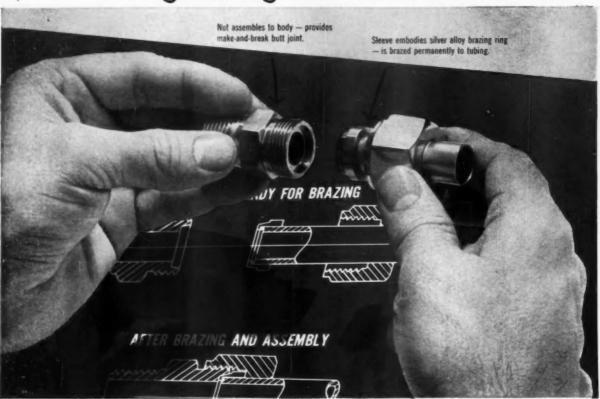
B.F.Goodrich Chemical Company a division of The B.F.Goodrich Company



GEON vinyls . HYCAR rubber and latex . GOOD-RITE chemicals and plasticizers



IMPERIAL Engineering and Data File



NEW BRAZE-SEAL TUBE FITTING

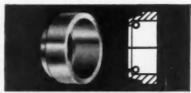
WITHSTANDS SUPER-PRESSURES, HIGH TEMPERATURES ... RETAINS MAKE-AND-BREAK CONVENIENCE

Until Imperial Braze-Seal came along, engineers could not specify an economical make-and-break fitting for tubing circuits involving super-pressures and high temperatures. Applications like these called for welded connections. But now Braze-Seal offers high reliability, even under extreme pressures. (See chart below.)

MAXIMUM DESIGN PRESSURES (PSI) FOR BRAZE-SEAL FITTINGS

Tube	316	Carbon	
O.D.	Stainless	Steel	
3/8"	64,000	48,000	
1/2"	62,400	46,800	
9/16"	61,600		
5/8"	61,600	46,200	
3/4"	60,000	45,000	
7/8"	56,000	42,000	
1"	52,000	39,000	
1-1/4"	48,000	36,000	
1-1/2"	44.000	33.000	

Application of the following sefety factor is recommended 4 to 1, for sizes up to 16" Q.D.: 6 to 1, for sizes 16" to 116" Q.D.:



This Braze-Seal Sleeve, containing a silver alloy brazing ring, is the key to the performance of the Braze-Seal Fitting. It assures a joint that will withstand these extreme pressures because it is permanently brazed to tubing. Yet the fitting provides the convenience of a make-and-break butt joint, as illustrated, and is extremely easy to assemble.

Reducing Sleeves Provide Versatility

Can be furnished to reduce any size Braze-Seal tube end to any specified tube size. Extremely convenient on tees, for example, where any size tubing can be connected to the same tee body. Also, the same body may be used for making up flareless Hi-Seal fitting joints.

Imperial Braze-Seal Tube Fittings can be furnished in steel or stainless steel.

Check the outstanding features of Braze-Seal for yourself. Send for a sample fitting. See how Braze-Seal can help you solve the most difficult problems in super-pressure and high-temperature tube circuitry.

IT'S IN THE BOOK

Braze-Seal Fittings are covered in Imperial's new Hi-Seal Catalog — the most comprehensive coverage available on the subject of fittings, a hardworking handbook for engineers. Send for your copy today.



THE IMPERIAL BRASS MANUFACTURING CO.

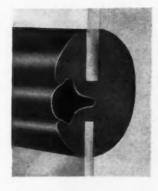
Dept. Al-90, 6300 West Howard Street Chicago 48, Illinois

8-60

custom designed

and 7 ways best...including lowest cost!





Specify Inland Self-Sealing Weather Strip for perfect weatherproofing of fixed windows

As a famous sculpture is custom designed, so Inland Self-Sealing Weather Strip is designed to do your weatherproofing jobs best in seven ways.

- Each application is custom designed to your prints, or may use our standard sections.
- 2. Basic seal pattern increases pressure to stop leaks.
- Absolutely leakproof job is assured by filler strip design, which eliminates cost of special moldings, channels, binders, or cement.
- Special Inland compounding increases sealing pressure, long life.
- 5. Design freedom is increased; design costs are reduced.
- 6. One-man installation in minutes reduces assembly costs.
- 7. Replacement is fast and easy.

Your lowest all-over weatherproofing cost for complete customer satisfaction is with Inland Self-Sealing Weather Strip for any type of fixed window installation.

Write, wire or phone today about your weatherproofing problems. Catalog on request.

INLAND



SELF-SEALING WEATHER STRIP

Inland Manufacturing Division
General Motors Corporation • Dayton, Ohio



.



Railway Foundment



Off-the-road Fouinment



Appliances

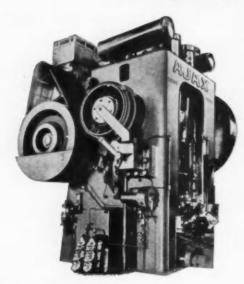


Marine Applications



Commercial Structures

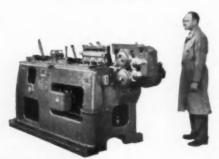
OF METAL WORKING MACHINES



"HIGH SPEED" FORGING PRESSES

Built in 13 sizes from 300 to 8000 tons capacity. Ajax Presses are built with massive, solid, mill housing-type steel frames. Rigid frames assure excellent alignment and accurate die match for the production of uniform and accurate forged parts.

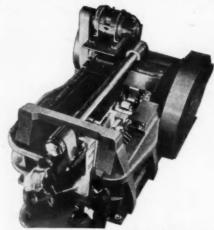
Write for Bulletin 75-C



AJAX-HOGUE WIRE DRAWERS

An attachment for any size cold header and parts former. It cold draws wire in a straight line from hot-rolled stock instead of cold-drawn wire. You save the difference in cost of material and at the same time produce the highest quality cold-headed parts.

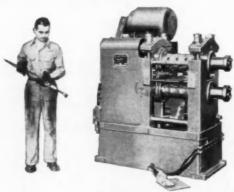
Write for Bulletin 111-B



"AIR CLUTCH" FORGING MACHINES

Choose from a complete line of forging machines—Sizes 1" to 12" to make the forged parts you need . . , Transmission gears —Flanged axle shafts — Crankshaft flanges —Jet Blade Blanks—Implement & Tractor forgings. There's an Ajax Forging Machine for every field of upset forging in industry.

Write for Bulletin 65-D



"WIDE ADJUSTMENT" FORGING ROLLS

Pre-roll your forging blanks for metal saving—longer die life—and better fibre flow. Ajax Rolls are available in 7 sizes to pre-roll forging blanks ranging from connecting rod blanks to the largest propellers. Extension shafts with overhanging dies permit rolling long work.

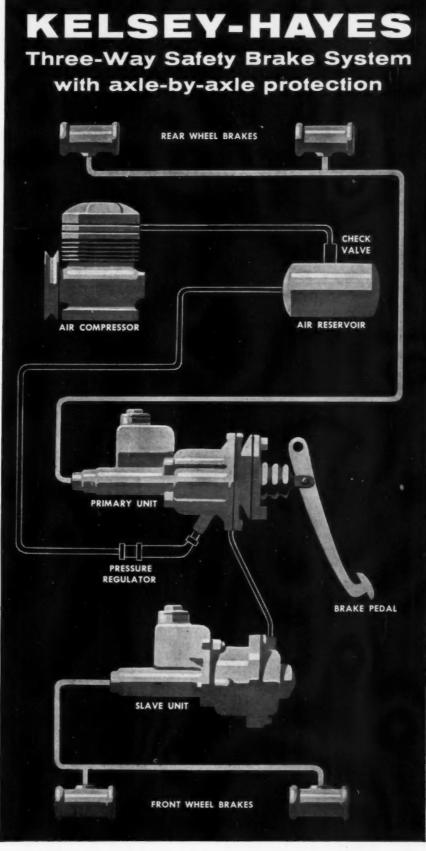
Write for Bulletin 91-B

THE Ajax

SERVING THE FORGING INDUSTRY SINCE 1875

MANUFACTURING COMPANY
1441 CHARDON RD. CLEVELAND 17, OHIO

CHICAGO OFFICE: 110 S. DEARBORN STREET CHICAGO 3, ILLINOIS WOOLDRIDGE CO. • BURLINGAME, CAL. • LOS ANGELES 22, CAL.



this new concept consists of two independent airactuated hydraulic systems, both of which are operated by the master unit.

1 If rear hydraulic line or wheel cylinder fails—you still have full front brakes with their own power assist!

2 If front hydraulic line or wheel cylinder fails—you still have full rear brakes with their own power assist!

3 If <u>air supply</u> should fail—you still have <u>direct mechanical</u> actuation of full rear brakes!

Write for "Three-Way Safety Brake System" brochure. Kelsey-Hayes Company, Detroit 32, Michigan.

KELSEY HAYES

COMPANY

Automotive, Aviation and Agricultural Parts Hand Tools for Industry and Home

18 PLANTS: Detroit and Jackson, Michigan; Los Angeles; Philadelphia and McKeesport, Pennsylvania; Springfield, Ohio; New Hartford and Utica, New York; Davenport, Iowa; Windsor, Ontario, Canada.





RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY



Technical-ities

By Fred E. Graves

No difference between hex and cap screws

It's not the name of a standard fastener that determines whether to use it for a particular application, but vice versa. The application requirements for strength and tolerances dictate the fastener.

Thus, if you have a joint that calls for certain tolerances in a screw, obviously the one which satisfies those tolerances is the right fastener.

IDENTICAL STANDARDS

In the case of cap screws and hex screws, the standards will show you that these are merely different names for the same product. They're actually made on the same machines, to identical tolerances, and from identical materials.

No reason then to differentiate. For tapped holes, merely specify Hex Screws (SAE Grade 2) or High Strength Hex Screws (SAE Grade 5), and you'll get the right fastener with the quality needed.

For bolted joints, these same items are supplied with nuts when specified.

This should suggest a way you can extend standardization in your plant . . . and benefit from our new simplification of nomenclature which calls any fastener with head on one end and threads on the other ascrew; and a screw plus nut a bolt.

See how "holding power" can cut fastener costs

SIZE SAE GRADE		SAE PROOF LOAD	COST RATIO
3/4"	Gr. 5	28,400 lbs.	100%
1"	Gr. 2	16,950 lbs.	188%
11/8"	Gr. 2	21,350 lbs.	239%
	Gr. 2	27,100 lbs.	277%

Since the usual job of a threaded fastener is to hold an assembly tightly together, its clamping force is what you're really utilizing. This seems obvious. But how best to get the clamping force needed for the joint design? Not so obvious. Looking at size alone can be misleading . . and quite costly, as the chart above demonstrates.

HOLDING POWER MEANS MORE THAN SIZE

SAE "proof load" of four different hex screws of standard steels, along with typical cost ratios, are compared. Almost unbelievable, isn't it? Yet it's a fact that the smallest of the group—the heat treated SAE Grade 5 RB&W High Strength Hex Screw exceeds all the others in load capacity. It can be used in place of any of the others in most normal usages.

Since it's smallest and therefore weighs the least, it also costs less... 64% less than the 1¼-inch grade

Circle 203 on postcard for more data

2 hex screw; 58% less than the 11%-inch; 46% less than the 1-inch. And since holes can be made smaller, there are also the savings in production drilling . . . and possibly in materials, too.

DESIGN ADVANTAGE

Remember, too, that smaller fasteners are more easily torqued to higher preload levels... which helps keep joints tight, makes them more vibration-proof.

If you would like to explore this approach to fastener economy and better utilization of "holding power," consult with an RB&W specialist. Let him contribute his fastener knowledge to your design and production needs. Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa., Pittsburgh; Detroit; Chicago; Dallas; San Frencisco.

NEWS

FEATURES

Dodge Trucks to Use Modified Slant Six

Dodge Div. will use a modified version of Chrysler Corp.'s inclined six-cylinder engine in light tonnage 1961 trucks. The 225 cu in. engine will have a rated horsepower of 140 at 3900 rpm, and compression ratio of 8.2 to one. (The passenger car version has 145 hp and 8.5 to one compression ratio.)

Dodge will use the inclined six as standard equipment on all conventional half-ton, three-quarter ton and one-ton models, on half-ton and three-quarter ton four-wheel drive units, and on three-quarter ton and one-ton forward control units.

The smaller 170 cu in. Slant Six engine also will be offered for special applications on '61 models.

Col. Davis Named Arsenal Commander

Col. John H. Davis has been named new commanding officer of the Detroit Arsenal.

Col. Davis has attended Washington University, General Motors Institute, the Ordnance School, Command and General Staff College and the Army War College.

Prior to military service, he was an engineering trainee of Shell Oil Co. For a number of years he was operator of an interstate motor carrier hauling refrigerated and dry products on trucks of their own design.

Col. Davis' military service began in September, 1942, as a civilian volunteer with assignment as a proof officer in the Automotive Division of Development and Proof Services, Aberdeen Proving Grounds, Md. Later, he was a project and research engineer in the automotive field.

Following a period as a civilian engineer, he became a regular Army officer in February, 1947.

During 1952-55 he served as Chief of Wheeled Vehicles, Research and Development Div., Office, Chief of Ordnance, Washington. Following his graduation from the Army War College, he served three years as Chief of Maintenance, Ordnance Div., in Germany, and then as Chief, Theater Maintenance Office, in Orleans, France.



Col. John H. Davis

Dura Purchases Page and Page

Dura Corp. has purchased Page and Page Co. of Portland, Ore., and plans to begin manufacturing part of the Page and Page truck and trailer equipment line at one of the Dura plants in the Midwest. J. Thomas Smith, Dura president, explains the purchase as part of Dura's diversification program, and also as a means of broadening Page and Page's distribution.

Page and Page makes heavy-duty trucks and trailer suspensions, full-floating fifth wheels for auto-motive tractors, shock-minimizing devices for truck transmissions, and custom trailers for various trucking industries. The company has plants at Portland and Denver, Colo., and Oakland, Calif. Page and Page will operate as a division of Dura

Towl Is Elected Grumman President

E. Clinton Towl has been elected president of Grumman Aircraft Engineering Corp. A founder of the Long Island company, Mr. Towl has been administrative vice president since 1954. He replaces Leon A. Swirbul, who died June 28.

In other changes, William T. Schwendler was promoted from senior vice president to chairman of the executive committee, and Llewellyn J. Evans, general counsel, was named a vice president.

TABLOID =

A survey of heat-treating practices for high-strength steels and a report describing the development of a corrosion-resistant steel for aircraft bearings have been prepared through the Office of Technical Services, Business and Defense Administration, U. S. Department of Commerce.

Publicly reported cash dividends paid in the first five months of 1960 totaled \$4½ billion, seven per cent above the same period in 1959. Increases in the dividend flow matched gains in total personal income.

. . .

Valuable guides on selling to or buying from the government, as well as basic information on specifications applying to Federal contracts, are contained in a 116page publication issued by the Small Business Administration. The publication is a revision and expansion of previous similar SBA booklets.

The best time to check air pressure in tires is in the morning, after a long drive, when tires are cool. Goodyear engineers say there is no need to stop periodically on a long motor trip to "bleed" air from tires.

Alloy steels with up to nine per cent nickel, because of their strength at low temperatures, are used for pressure vessels and tanks that contain liquid oxygen and nitrogen and other missile materials.

Air Force-sponsored researchers explain the preparation of thin films by pyrolytic deposition and other means for potential use in composite molecular electronics in a report released to science and industry. Also available is a Navy report on a direct-reading six-decade precision frequency generator, and a study of the processes occurring during the spontaneous ignition of hexane isomers.

Recent advances in titanium welding—including the use of inert-gas shielded metal-arc welding in production of titanium assemblies—have been prepared by experts for use of prime contractors on both government and private industry contracts. Also available is a review of the application of certain ferrous castings in aircraft and missiles. It cites the continued improvement in foundry technology enabling foundries to produce complex, quality castings for the aircraft industry.

Forty specialists in metallurgy, plastics and related fields have compiled for the Army a broad, comprehensive survey of recent advances and probable future developments in composite materials and structures. The 562-page collection of reports is available to science and industry. Also available is an Army materials review highlighting polymers and plastics and a tabulation of standard designations of aircraft and missile alloys.

Consumption of ductile iron by the farm equipment industry is estimated to have more than doubled in 1959. Discovered and developed by International Nickel, this comparatively new material is being used for gears, sprockets, hitches and various structural components in tractors, plows and harvesters.

A technical training program to teach professional industry personnel basic considerations in applying radioisotopes to industrial work has been issued by General Motors researchers. The program consists of 69 detailed training session outlines. The two-volume report contains 1500 pages of course outlines, technical data, charts, graphs, diagrams and photos on the industrial uses of isotopes. It is available from the U. S. Department of Commerce.



Dr. W. A. Wesley has been elected president of the American Electroplaters' Society. He is manager of International Nickel Co.'s research laboratory.

Industry Hailed On Air Conditioning

The automotive industry is doing a better job of selling air conditioning than the air conditioning industry, Joseph B. Elliott, president of the York Div. of Borg-Warner Corp., declared in a talk in Washington, D. C.

Speaking at a management institute sponsored by the National Appliance and Radio-TV Dealers Association, Mr. Elliott said that less than 3000 autos were air conditioned in 1950 compared to an estimated 750,000 this year. "Half of all new cars will roll off the assembly lines five years from now with air conditioning," he predicted.

The York president noted that his company is now at work designing a thermoelectric air conditioning system for submarine use but said "we are still some distance away from large-scale, mass-produced residential or commercial thermoelectric air conditioning that is economical to buy or to operate."

Production Forum Scheduled by SAE

A two-day production forum and 12 technical papers will highlight the SAE national farm, construction and industrial machinery meeting Sept. 12-15 in Milwaukee. Papers will cover lubricant additives, earthmover skins, styling, hydraulic filters, power train bearing life, design analysis and component life, and other related topics.

The production forum, Sept. 12-13, will feature panels on heat treating, welding methods, gear and spline design and production, precision tooling, scheduling control and engineering-manufacturing relationships. General chairman of the meeting is D. G. Thomas of the Nelson Muffler Corp.

New 'Spy' Plane Disclosed by Army

The Army has disclosed details of a new, unmanned spy plane designed to fly 200 miles behind enemy lines to disclose troops and potential missile targets.

Fairchild Engine & Airplane Corp., Hagerstown, Md., is developing the surveillance system for the Army Signal Corps. Fairchild contracts total \$48.6 million.

The device which would send back information to ground crews would allow Army commanders to "watch" enemy troop movements.

First plans called for three basic kinds of sensors — photographic equipment, radar and infra-red detectors. Now, scientists are planning instruments to measure the effects of atomic blasts for mapping enemy terrain.

The battlefield "spy" consists of a jet drone about 36 ft long with a 24-ft wing span. The plane is de-

RUSSIANS HAVE WIDE-TIRE TRACTOR



Two ft-wide tires enable Ukrania T-90 tractor to traverse soft ground and swampland. It has 90-bhp Diesel engine and the transmission has 12 forward and four reverse speeds. It is intended for hauling eight-ton semi-trailer.

signed for launching with a rocket booster from a flatbed trailer. Electronic gear on the ground controls its flight and receives data from the devices aboard the drone.

While Army officials refused to discuss the speed or altitude of the drone, they said it would fly at low altitudes and high speeds and would not be stopped easily by enemy forces.

Chevrolet Buys Plant For Parts Output

Chevrolet will convert a former war plant near Detroit to parts production. The plant, in Van Dyke, north of Detroit, was purchased from the government for \$3.5 million. Hudson Motor Car Co. occupied the plant for $2\frac{1}{2}$ years

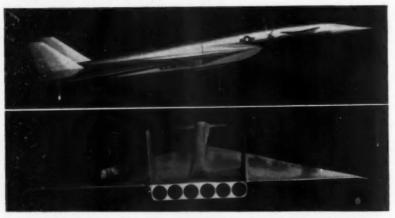
during World War II, and since then the facilities have been leased by both Ford Motor Co. and Chrysler Corp. The plant covers 123 acres and includes 16 buildings.

Chevrolet also has plans for using a former aviation engine plant adjacent to the division's own engine plant in Buffalo. Chevrolet, the only bidder, offered the government \$1.5 million for the plant.

White, Oliver Confer

White Motor Co. is continuing its talks with Oliver Corp. for acquisition of Oliver's Farm Equipment and Crawler Tractor Divs.

J. N. Bauman, White president, said, "We are still negotiating toward final areas and toward getting a method of financing."



Under development at North American Aviation, Inc.'s Los Angeles Div., the B-70 Valkyrie bomber for the Air Force is expected to fly at three times the speed of sound. Six General Electric J93 jet engines, centered under the wing (lower photo) will supply power for the advanced aircraft.

Air Force to Order 150 Jet Transports

The Air Force has announced plans to buy 150 new jet transports capable of carrying 50,000 lb payloads non-stop across the Atlantic Ocean and 25,000 lb non-stop over the Pacific.

Maj. Gen. Bruce K. Holloway, Air Force director of operational requirements, said design competition among aircraft manufacturers probably will start within a year. Target date for operational planes is 1964.

Gen. Holloway said the transports would be powered by turbofan engines and would cruise at 500 mph. They will be built to carry cargo but could be converted to troop use. He added the transports would be large enough to carry a Minuteman missile and supporting equipment for long distances.

Air Suspension Used On Missile Carrier

Air suspension may be passe on passenger cars, but it has found a niche in the missiles field as a ridecushioner for ground support equipment. GMC Truck and Coach Div. is using air suspension for a tractor and trailer combination designed for transporting the Minuteman ICBM. GMC delivered a prototype of the missile carrier to Boeing Airplane Co. and the Air Force last month for evaluation tests.

Other features include GMC's Twin Six (V-12) gasoline truck engine, four-axle tractor and three-axle trailer, and low overall cab height of only six ft.

Hupp Acquires Canadian Concern

Hupp Corp. has purchased outstanding stock of E. Roy Industries, Ltd., of Montreal. The concern produces refrigerators, gas and oil warm-air furnaces, gas and electric ranges, and aircraft parts.

Don E. Gearheart, president of Hupp, said the acquisition strengthens Hupp's position in Canada by eliminating the 20 per cent import duty and freight costs. Hupp, he said, expects to add food freezers and air conditioners to the line.

Sparton's Illinois Plant

Sparton Manufacturing Co. has started operations at a new 62,000 sq ft plant in Flora, Ill. The new facility will produce automotive accessories, stamped metal parts, commercial electronics products and a new Sparton automobile horn.

Autolite Continues Diversification Program

Electric Autolite Co. will purchase a majority interest in Equitable Leasing Corp., international industrial and business equipment leasing concern. Autolite will buy 600,000 shares of Equitable's common stock and \$2,880,000 of subordinated convertible debentures. Other shares may be acquired from individual stockholders.

Equitable, formed a year ago by officers of Zilkha & Sons, Inc., specializes in financing, foreign exchange and investments. It leases industrial handling equipment, machine tools, automotive trucking equipment and office equipment.

Robert H. Davies, Autolite president, said the acquisition was in line with Autolite's diversification policy.

Several weeks ago, Autolite directors approved merger with Hiller Aircraft Co., manufacturer of helicopters.

New Rocket Engine By Bristol Siddeley

Bristol Siddeley has announced a new rocket engine—the Stentor A. S. St. 1-1—which will power the Avro Blue Steel guided stand-off bomb. It has two combustion chambers, one four times larger than the other, and burns kerosene with hydrogen peroxide as an oxident.

The unit is said to be in quantity production in Coventry.

The British company also has revealed the existence of a new ram-jet engine, the BSRJ.824, intended for high-altitude supersonic operation. No details have been released other than its length of 99.6 in. and diameter of 18 in.

Wind Tunnel Aids British Research

A full-size wind tunnel recently installed at Lindley, England, by the Motor Industry Research Association offers British auto manufacturers facilities for aerodynamic research. Housed in an unused aircraft hangar on the M.I.R.A. proving ground, the tunnel has a total length of 150 ft, including a 50-ft working zone that is 26-ft wide and $14\frac{1}{2}$ ft high.

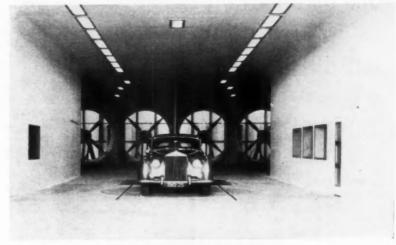
Four 13-ft extractor fans driven by individual 325-hp electric motors give a maximum air speed of 80 mph, with air drawn in through a flared entry and a honeycomb straightener. After passing through the narrow neck, air is slowed down in a diffuser where it is exhausted into the hangar and recirculates on an open-return circuit.

The tunnel floor incorporates a circular platform, supported on compressed air bearings, that can be rotated to produce any desired yaw angle for measuring cross-wind effects as well as head-on drag, noise and other factors. There is also a chassis dynamometer capable of absorbing 250 hp from the drive wheels which makes it possible to determine the efficiency of the cooling system at varying engine loads and air-flow rates.

Rocket Fuel Safety To Be Discussed

Safety problems in missile firing and in the use of solid rocket propellants and jet fuels will be discussed in Chicago at the aerospace and air transport sessions of the 48th National Safety Congress.

The meetings, which will be held Oct. 17-21, will be addressed by Brig. Gen. Walter E. Arnold, director of flight and missile safety research. Other speakers will discuss safe handling of solid and liquid missile and rocket propellants.



Wind Tunnel Tests British Autos

Radar Surveillance For Army Planes

Eleven Army L-23D twin-engine Seminole aircraft are being modified for installation of newly developed airborne radar battlefield surveillance equipment.

With installation of the new sidelooking airborne radar (SLAR), the aircraft will be re-designated as RL-23Ds

Developed jointly by the Army Signal Corps and the Texas Instrument Co., the equipment permits radar photographs to be taken from the aircraft, under all weather conditions, while flying parallel to the area to be scanned.

RL-23Ds are powered by two supercharged Lycoming engines, each developing 340 hp at take-off. The planes are equipped with automatic pilot and are fully instrumented for all weather operation. Normal crew includes pilot and radar operator.

Modification of the 11 planes is being done by Beech Aircraft Co.

Goodyear Producing At French Plant

The first tire manufactured at Goodyear's new plant at Amiens, France, rolled off the production line just a year after construction of the \$7 million facility began.

The Amiens plant, 15th to be built overseas by Goodyear, is located on a 75-acre tract 80 miles north of Paris along the Somme River. Production will include complete lines of passenger, truck and farm tires and tubes for original equipment and replacement.



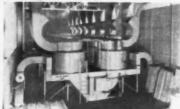
New motor bike capable of 40 mph and 125 mpg is being marketed by Columbus Cycle Co., Columbus, Neb. It is powered by 2½ hp four-cycle engine.

Turn to page 151, please

THE SCOPE OF CENTRI-SPRAY ... PROVIDES THE LATITUDE TO FILL YOUR PRODUCTION AND TESTING REQUIREMENTS



INDUSTRIAL WASHING MACHINES . . . This machine washes cylinder heads at rates up to 400 per hour.



DUST COLLECTORS and AIR WASHERS . . . This dust collecting system for a bumper polishing line handles 450,000 cubic feet of air per minute, returning the air to the building.



SPECIAL MACHINES . . . Automobile frame piercing and machining line has an output of 120 frames per hour,



MATERIALS HANDLING EQUIPMENT . . . Engine block transfer line set up for test in one of our final-assembly bays.



WET ABRASIVE CLEANING and DEBURRING EQUIPMENT . . CENTRI-BLAST machine automatically deburrs 250 finished aluminum transmission cases per hour.

TEST STANDS . . . CEN-TEC dynamometer stand for checking speed ratio, torque and hydraulic pressure on a 10-speed tractor transmission.



PLUS . . . paint spray booths, clarifiers, leak testers . . . hydraulic, pneumatic, and electronic test equipment. Write for details to suit your requirements.



39001 SCHOOLCRAFT RD., LIVONIA, MICH.

MEN

IN THE NEWS



Ford Motor Co.— Dale Roeder has been appointed chief engineer for military vehicles operation.



Walker Mfg. Co.— Benedict L. Brumleve has been appointed Indiana territory manager.



Kelsey-Hayes Co.— Robert A. Maxwell has been named a vice president and director of sales.



Stewart - Warner Corp., Alemite and Instrument Div. — Erwin H. Poelke has been named assistant manager of original equipment sales and Detroit office sales manager.



Clark Equipment Co., Brown Trailer Div.—Carmen L. Johnson has been appointed manager of Reading, Pa., plant,





Divco-Wayne Corp.—Holmes T. Collins has been promoted to vice president—manufacturing.

Gabriel Co.—Thomas A. Chervenak has been appointed assistant trea-

Ford Motor Co., Steel Div.—Stanley J. Gillen has been appointed general manager.

Nabors Trailers, Inc.—Claude H. Roberts has been elected president of this new corporation, composed of trailer subsidiaries of Sterling Precision Corp.

American Radiator & Standard Sanitary Corp., Industrial Div.—A. F. L. Anderson has been named director of value analysis.

Electric Autolite Ltd.—William F. Purves has been named president.

Hoefer Mfg. Co.—Emmert A. Timm has been elected vice president.

United States Steel Corp.—John E. Angle has been appointed administrative vice-president — steel producing divisions.

Electric Autolite Co.—Robert W. McKay has been named chief engineer for generators, and Roger DeYoung has been appointed chief engineer for alternators.

Parker-Hannifin Corp., Parker Fittings & Hose Div.—A. N. Aiman has been named sales manager.

B. F. Goodrich Co.—Howard F. Miller, Los Angeles district field manager, has retired after 48 years.

Goodyear Aircraft Corp.—Richard H. Haas has been appointed manager of plastic sales.

Pittsburgh Plate Glass Co., Glass Div.—H. W. Gardner has been promoted to chief engineer.

Ford Motor Co., Ford Div.—J. E. Acker has been appointed manager of Metuchen, N. J., assembly plant, and C. T. Baughman has been named assistant manager.

General Motors Corp.—William B. Ardery has been named Washington office manager.

Beech Aircraft Corp. — James N. Lew, vice president in charge of all Beechcraft military activities, has been named vice president—engineering, and Frank E. Hedrick has been named executive vice president.

B. F. Goodrich Co., Industrial Products Co.—Robert E. Davies has been appointed technical manager of molded goods.

United States Steel Corp.—Harvey B. Jordan has retired as executive vice president and chairman, General Administration Committee, after 46 years.

Ford Motor Co., Ford Div.—Walter T. Murphy has been promoted to public relations manager.

Tidewater Oil Co.—A. J. Senec has retired as manager of eastern division economics department after 42 years.

Perfect Circle Corp.—L. R. Wilson has been appointed manager of manufacturers' service sales.

United States Steel Corp., U. S. Steel Products Div.—Carroll R. Justice has been appointed vice president—sales.

Clinton Engines Corp.—Robert W. Thill has been named replacement sales manager.

Necrology

J. Merle Hosdowich, 65, chromium plating pioneer and retired technical advisor to Metal & Thermit Corp., died July 15 in Tucson, Ariz.

William H. Howley, 52, group personnel staff executive for Chrysler Corp., died Aug. 1 in Royal Oak, Mich.

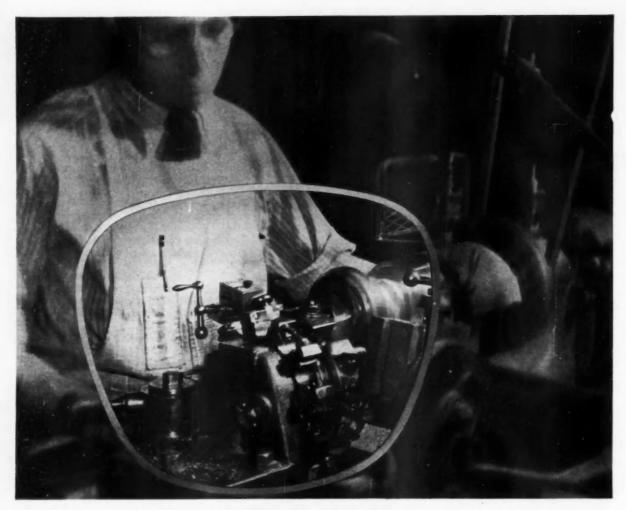
Richard V. Topolewski, 68, coowner of the Popular and Special Nut Co., died Aug. 3 in Stoney Point, Ont.

Carl R. Wippern, 60, president of McQuay-Norris Mfg. Co., died Aug. 4 in St. Louis.

Harvey J. Rhodes, 69, chief general auditor for Chrysler Corp. when he retired in 1957, died Aug. 5 in Detroit.

Joseph P. Stanton, 68, retired purchasing agent for Ford Motor Co., died Aug. 13 in Detroit.

General Motors Corp., Cadillac Div.— George R. Elges (tar left) has been named head of all fabrication and assembly activities and Harrison M. Goodhue has been appointed to head scheduling, planning, material control, traffic and works standards.



EYE PROTECTION IS NOT ENOUGH B&L helps you fit the vision to the job with prescription safety lenses

To stop accidents before they happen, make sure your employees can see well on their jobs. For workers who need visual correction, the safest, most comfortable vision results by combining correction with protection in Bal-SAFE prescription lenses.

These lenses are products of a century of research and development. Their superiority is evident in their extra impact resistance, in their superb focus and surface qualities, and quality of ophthalmic glass used. Bausch & Lomb is the only manufacturer of professional quality ophthalmic lenses that operates its own glass plant—and controls glass quality from sand to finished product.

Local laboratory finishing is as superior as original factory product. All Bal-SAFE prescription lenses are heat treated by an exclusive patented process that gives them as much as 14 times the impact resistance required by government standards. You pay no more for this extra safety margin.

How do you make *sure* your employees see right for their jobs? A B&L representative will be glad to explain how your workers may benefit from Bal-SAFE prescription lenses, and how the B&L Ortho-Rater quickly and easily pinpoints those who need professional eye care. Call your supplier, or write: Bausch & Lomb Optical Co., 98609 Lomb Pk., Rochester 2, N. Y.



Protection-PLUS Safety Products

protection + economy + worker acceptance

Productivity as a National Resource



an Editorial

URING THE PAST MONTH leading manufacturing engineers in the automotive industries have returned to their own plants, after lengthy visits in leading plants in Europe and the United States. Their personal, oral reports to your editors of AI provided information which might well be considered as being most timely in view of the great interest of automotive engineers in The Machine Tool Exposition of 1960. New installations of production machine tools in both Japan and Germany, for example, proved to these observers that it is important for our own government to clarify the national view of the economic importance and function of our modernization of manufacturing equipment.

THESE OBSERVERS REPRESENT large manufacturing organizations in this country. They said that in many respects both Germany and Japan have national policies which encourage the use of new and highly productive metalworking equipment much more than do our American national policies. The results can be seen in the plants where new and unique installations in both of these countries have provided a foundation for a standard of productivity which is well in advance of American practice in many operations. This situation suggests that our country needs to consider, develop and adopt policies which will enable domestic manufacturers to keep abreast of production methods in every other country in the world.

THE REPORTS OF THESE OBSERVERS show that the urgency for review and revision of national policies is not a problem which should be deferred until future years. It is a problem that must be studied and dealt with now, if America is not going to fall behind badly in the international competition for high quality, volume production, low costs and other critical competitive advantages.

IF THESE PROBLEMS ARE TO BE dealt with now, what can be done to improve the country's total productivity environment, and in doing so, improve productivity opportunities for the automotive industries? There are many things which can be moved ahead without new national legislation to authorize important advances. A first step, for example, would be to fulfill the mandates of Congress concerning the modernization of machine tools for defense production. This can be done immediately. A second step would be to improve the environment for obtaining financing for major new equipment installations. This too, can be done immediately.

THERE ARE SOME ADDITIONAL STEPS which would take more time and additional legislation. For example, corporate tax rates could be adjusted to improve deductions and allowances for production equipment modernization.

THE ALTERNATIVES TO SUCH STEPS of decisive action in the national interest are not a pleasant picture. If such measures are not provided, this country can expect to see a further acceleration of the movement of American plants abroad or the expansion of branch plants abroad. We can expect to see further and broader gaps between higher and higher costs in the United States and lower and more profitable production costs among international competitors. These trends will occur at a time when it is vitally important for American companies to improve their total capabilities to produce profitably for export. Let's make September a time when we bring these needs for improved national policies into full view from every standpoint. We must emphasize the fact that America's metalworking productivity is a vital national asset and a major bulwark of America's economic future.

Horay w Barcley

Editor and Publisher







If you want to spotweld from one side only, Aircospot is the number one gun for really precise light gauge work. For heavier jobs, there's the Aircomatic spot . . . and, for low-cost resistance spotwelding on light gauges, be sure to check Tuffspot.

SPOTWELDING, too, means AIRCO ... backed by the most experience

For spotwelding rail cars . . . or radar telescopes . . . or auto frames-or anything in your operation-there's Airco equipment to give you top results.

Spotwelders, shielded arc welding equipment, arc welders, gases, and a complete line of other welding equipment-all

are produced by Airco. You can get them from your nearest Airco office or Authorized Airco Distributor. Look in your Classified Telephone Directory under "Welding Equipment and Supplies" for your nearest Airco representative.



AIR REDUCTION SALES COMPANY

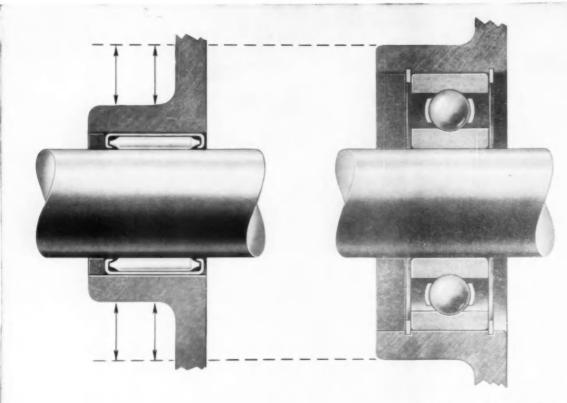
A division of Air Reduction Company, Incorporated 150 East 42nd Street, New York 17, N. Y.

More than 700 Authorized Airco Distributors Coast to Coast

Im Cuba— Cuban Air Products Corporation

In Canada— Air Reduction Canada Limited All divisions or subsidiaries of Air Reduction Company, Inc.





Designed for Compactness... Torrington Needle Bearings

Simpler, more compact design is possible wherever Torrington Needle Bearings are put to work in eliminating friction problems.

These outstanding bearings offer a higher radial load capacity than any other bearing of comparable size. They are more compact, lighter in weight, and are lower in unit cost. The full complement of small-diameter precision rollers insures exceptional antifriction performance and long, maintenance-free service life. The turned-in lips on the outer shell guarantee positive roller retention. Installation and assembly are fast, simple, economical.

The unmatched design and production advantages of Torrington Needle Bearings have been proved in applications ranging from office machines to automobiles, washing machines to earth-moving machinery. Give *your* product the benefit of our antifriction know-how. Write or call Torrington—maker of every basic type of antifriction bearing.



TORRINGTON NEEDLE BEARINGS FEATURE:

- Full complement of retained
 rollers
- Unequalled radial load capacity
- Low coefficient of starting and running friction
- · Low unit cost
- Long service life
- Compactness and light weight
- Run directly on hardened shafts
- Permit use of larger and stiffer shafts

progress through precision

TORRINGTON BEARINGS

THE TORRINGTON COMPANY

Torrington, Conn. . South Bend 21, Indiana

MAXIMUM MACHINE UTILIZATION

FOR TODAY...



a Design Feature of all Transfer Machines that carry this Name Plate

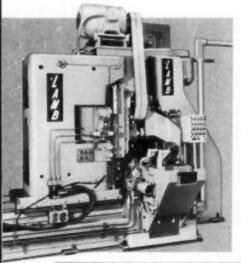


Another



Transfer Machine.

A Few Typical Examples of LAMB'S Maximum Machine Utilization Feature



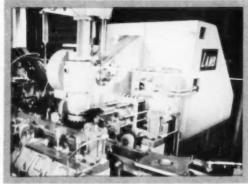
Adjustable Compound Milling Slide

This milling station, although part of the transfer machine, is in itself a standard self-contained milling machine. It can be used to perform a wide variety of milling operations simply by adjusting the controls. In this arrangement the horizontal slide is used for rapid approach and return. The vertical slide feeds the milling cutter across the workpiece.



Single-Slide Double-Station

Here is an outstanding illustration of Maximum Machine Utilization. The vertical and horizontal double-heads perform operations at two stations simultaneously. Each is carried on its own slide and has its own bushing plate. Note the multiplicity of operations performed simultaneously.



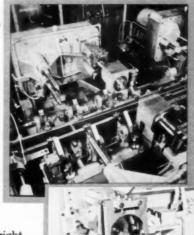
Combination Slide-Milling and Tapping

This 2-station, single slide provides two individual feed rates—one for milling, one for tapping. Approach, feed and retract movements of the milling cutter are controlled by the hydraulic power slide while the tapping tools are controlled by a lead screw sliding plate.

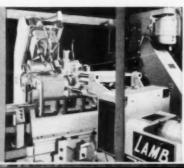
Large Hole Threading With Collapsible Dies

To minimize cycle time, collapsible dies are used to produce internal threads in opposing 4% diameter holes. The dies are reset automatically. Although this is not a new method of chasing threads in large holes, the dependable, repeatable accuracy built into this operation by Lamb, greatly increased the overall efficiency of the machine.

Closeup photo at lower right shows the study guide bars and support saddle that aid in removing the heavy die assembly when chaser sharpening is necessary.







Tilting Fixture Utilized To Eliminate Extra Work Station

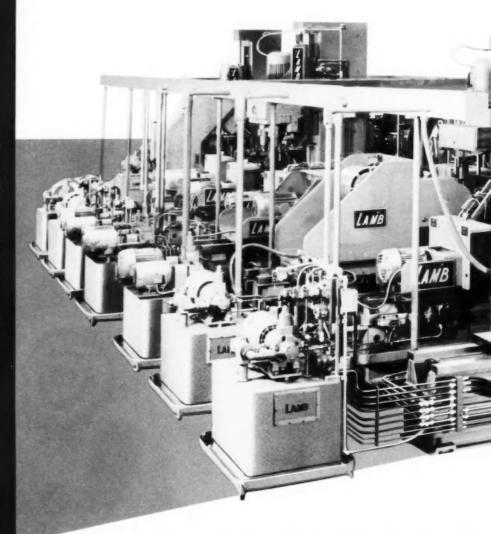
To gain access to the bottom flange of the part for drilling angular oil holes, a tilting fixture station is used. Through simple redesign of the fixture and mounting a tapping head at a compatible angle, Lamb eliminated an extra work station saving the cost of an additional main base, fixture and extension of the transfer mechanism.



Designed for Present and High Product

Another example of Lamb's thorough understanding of modern manufacturing methods and ability to provide efficient, high production machine tools to do the job is illustrated and described on these pages. The design features

of this transfer machiconscious approach to at hand as well as to lo economy including prochangeover.



Lamb Differential Carrier Transfer Mac

This 34-station in-line transfer machine accommodates two different parts. In the analysis of the parts and the operations to be performed, it was determined that the differential carriers were particularly suited to the 2-station, single-slide machine design. The result is a more compact machine requiring fewer components and represents an overall savings in initial cost, floor space and service maintenance.

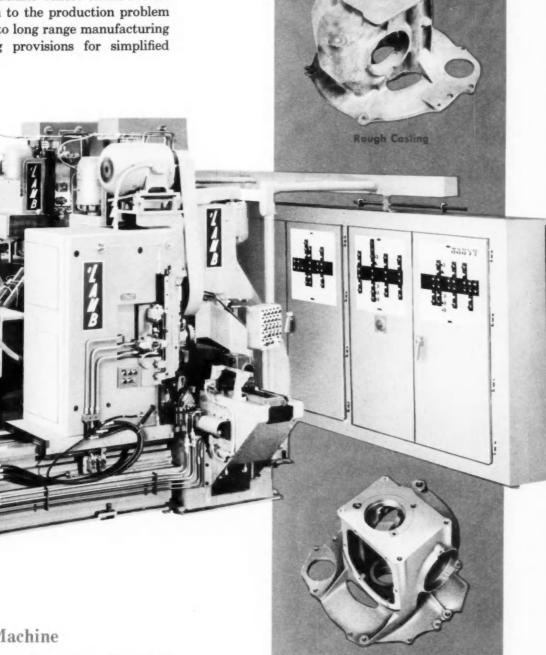
There are 72 mac include: drill (28), tap (8), spotface (3), mill ((13) holes are probec cycle produces 128 pcs

A push button at to out several work units machine the second pasame for both parts.

d Future

ction Jobs

achine reflect Lamb's cost-



machining operations which tap (17), chamfer (13), bore ill (2), and ream (1). Thirteen obed. A 28-second machine pcs./hr. at 100% efficiency. at the operator station locks inits that are not required to d part. Production rate is the

Submit Your Part or Part Prints for Analysis or Suggestions

MAXIMUM MACHINE UTILIZATION EXTENDS TO FUTURE PRODUCTION



Include your present Lamb transfer machines in your future production plans. Retooling for new models or part design changes requires little more than new fixtures to suit the new part plus rearrangement of Lamb standard "Building Block" machine components.

These standard components meet industry's demand for versatility and flexibility in processing equipment. Shown below are several Lamb "Building Blocks" used in the differential carrier transfer machine.



Double Wing Main Base



Quill Type Drilling Unit—Hydraulic



Way Type Drilling Unit



Hydraulic Power Unit



Way Type Wing Base 18" Travel



Way Type Wing Base 24" Travel



Single Wing Main Base



Vertical Column



Probes Replaced
In Seconds

Horizontal and vertica are held in their bagainst a spacer plat light spring-loaded bar arrangement which p Simplicity of design an machines.



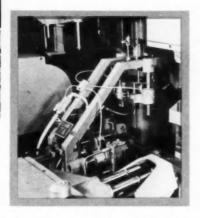
Engineers an

ENGINEERING INGENUITY

Improves roduction Efficiency

Simple Linkage Repositions Part

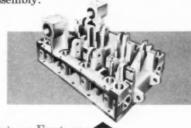
A plate, swivel mounted on the transfer bars, carries the part. As the transfer bars move forward the ball type toggle linkage turns the plate and part 90 degrees. Lowering of the walking beam transfer bars places the part on locator buttons in position for the next operation. The plate and linkage are maintenance free. Only occasional greasing of the ball joints is required.



bar. Only one limit switch is required with this

ch permits single or multiple hole probing, in and ease of maintenance are features of Lamb Service Accessibility

Lamb's open-machine design permits easy access to fixtures, tools and all components that require periodic attention. Convenient location and manifold mounting of hydraulic assemblies minimizes downtime. Pipe fittings are grouped for fast, sectionalized machine assembly and disassembly.



Fixture Features

Lamb fixtures are heavy, rigid castings with integral chip sheds. They are precision machined and assembled with quality components that assure accuracy and long, dependable service life. Simple assembly features for EASE OF SERVICE is an important characteristic of Lamb machine fixtures.



The finest in automated materials handling equipment and either special or transfer-type machines are produced in this completely staffed, modern facility.

LITHO IN U. S. A.

LAMB

rtical probes ir bushings

plate by a

SIN C E () 1914

5663 E. NINE MILE ROAD . DETROIT 34, MICHIGAN

and Builders of Special Machines and Automation Equipment



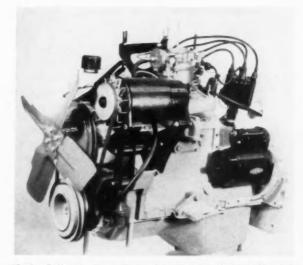
The Tempest Features: a four cylinder engine curved torque tube swinging transaxle



New Tempest Offers

Four Cylinder Engine

Pontiac's Latest Offering Has Transaxle Mechanism with Swinging Axles; V-8 Engine Available as Option



Most of the engine accessories are mounted at the left of the cylinders

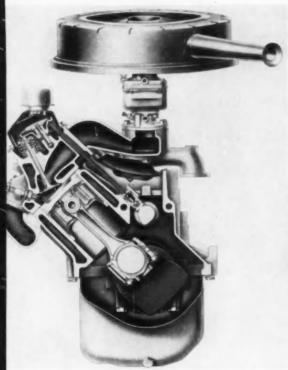
I launching the Tempest, Pontiac has introduced the first modern automobile in many years to be powered by a fourcylinder engine. At the same time the Tempest engine represents an entirely new breed. It is neither small nor low-powered. In fact, it is a modification of the right bank of the current Pontiac V-8 engine, inclined at 45 deg to the vertical axis. It has a displacement of 195-

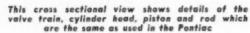
cu in., just half of the V-8, and will profit by interchangeability of many components of the V-8. Similarly, it is obvious that much has been gained in production economy by maintaining the same configuration and using certain interchangeable parts.

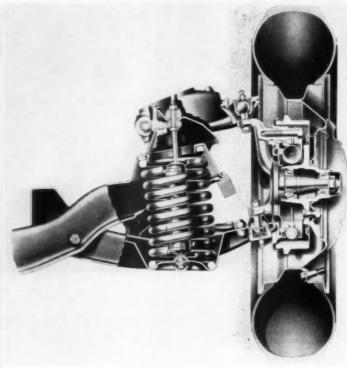
For 1961 the Tempest line consists of a four-door sedan and a Station Wagon both mounted on a wheelbase of 112-in. Although both

bodies accommodate six passengers, maximum width over bumper ends is 72.2-in., while the tread has been compressed to 56.5-in. front, 56.8-in. in the rear. Another noteworthy feature of the Tempest line is the adoption of a fully unitized body.

The four-cylinder engine is not the only innovation in this entirely new kind of motor car. For Pontiac has created an entirely dif-







Front suspension employs an A-frame upper control arm and a cantilever lower control arm. Mounting shafts are rubber bushed

ferent kind of chassis, featuring a transaxle mechanism with swinging axles at the rear. Although swinging axle design has been discussed for many years, there is no question that Pontiac is the first to employ this configuration in conjunction with a front mounted engine.

The chassis layout has further novelty. Here we find a long torque tube of hat-type section, of heavy gage steel, curved slightly downward so as to practically eliminate the center tunnel through the body. Another radical departure from the conventional is the propeller shaft which consists of a $\frac{5}{8}$ -in. diameter forging.

Tempest offers six engine options as outlined in the engine table. It will be noted that there are five versions of the 4-cylinder engine. The V-8, the new aluminum engine, will be described in another issue.

The standard four-cylinder engine naturally embodies the major features of the more familiar Pontiac V-8. Among these are:

aluminized valves, ball-pivot valve train, hydraulic valve lifters, and full pressure lubrication. In addition, it will have automatic choke with the automatic transmission option; and is the first production engine of its kind to employ a fourbarrel carburetor for a power op-

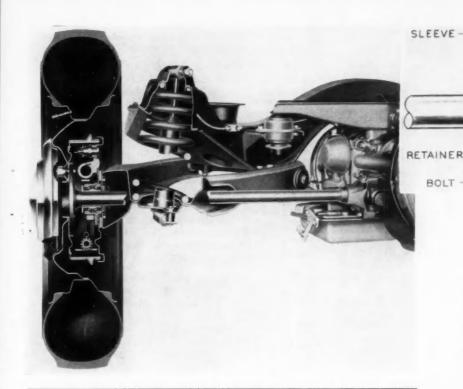
Inclined 45-deg to the right, the engine has the exhaust pipe and manifold on the right side. The intake manifold, carburetor, fuel pump, generator, and starter are to the left of the bank, the carburetor being located vertically over the centerline of the crankshaft as in the V-8 version.

The crankshaft is a pearlitic malleable iron (ArmaSteel) casting with five main bearings and generous overlap of main bearings and crankpins to provide greater rigidity. It has four integrally-cast counterweights with final balance held to 0.50-oz in. Additional smoothness is imparted by use of a harmonic balancer.

Heat-treated aluminum alloy, slipper skirt, tin-plated pistons are

employed. Weight is held to a tolerance of 1/16-ounce. High strength cast iron compression rings are used, the upper ring being chromium-plated. The oil control ring is of spring steel with expander, the bearing surface being chromium-plated.

Positive full pressure lubrication is similar to that of the Pontiac V-8, suitably modified for the Four. Pressure oil feeds to crankshaft, connecting rod, and camshaft bearings, as well as to the valve actuating mechanism. Piston pins and bushings are splashlubricated, while timing chain and sprockets have metered jet-lubrication. Oil pressure is supplied by means of a spur gear pump, mounted to the rear bottom of the cylinder block. Hydraulic valve lifters are lubricated intermittently from holes drilled in the main oil gallery, each of the hollow pushrods being fed from holes in the valve lifters. In addition, oil is fed to the cylinder head to lubricate valve mechanism bearing surfaces. Oil pan capacity is four quarts. A full flow oil



Control arms of the rear suspension are of A-frame type. Each universal joint has a splined yoke which extends into a differential side gear.

filter is available as an accessory on the four-cylinder engine.

A three-port, cast iron exhaust manifold is mounted on the right side, with ports mating with exhaust channels in the cylinder head. A spring-loaded thermostat is included for preheating the intake mixture. The exhaust pipe is a steel tube 1.75-in. in diameter, tailpipes being steel tubes of 1.5-in. OD.

Front suspension, as illustrated, is of compression strut configuration with an A-frame upper control arm and a cantilever lower control arm with compression strut. Rubber bushed mounting shafts are employed. The strut is mounted at the rear with rubber bushings, while the inner end is threaded to permit adjustments of caster angle by varying the length of the strut. Front coil springs and shock absorbers are seated on the lower control arm, the tops of the springs being seated against rubber.

Half-ball joints with phenolic resin seats and anti-drive geometry also are employed. Front wheel bearings are of tapered roller bearing type.

Perhaps the major interest centers about the swinging transaxle and rear suspension. In this configuration, the unitized body has a cross-member attached at four points. The transaxle assembly is then attached to a support saddle

mounted in rubber on this crossmember. The entire mass of the transaxle becomes part of the sprung mass of the car, the drive to the wheels being by means of short axle shafts with a universal joint on each side of the differential.

One of the bearings for supporting the drive shaft in the torque tube

INSULATOR

BEARING

PROPELLER SHAF

Control arms of the rear suspension are of A-frame type, each one carrying four studs which extend through the brake backing plate for attachment. This then forms the lower seat for the coil spring and angled shock absorber, the upper seat being provided by the suspension cross-member, mentioned earlier. The axle shafts have a splined yoke universal joint, the splined end extending into the differential side gears.

The long, rigid torque tube joins the engine and transmission to provide a backbone for the drive train. Operating within this curved

1961 Pontiac Tempest Engine Options (All OHV Type) BASIC ENGINES

Туре	4-cyl. Incli	ined V-8
Bore (in.) Stroke (in.) Displacement (cu in.)	4½ 33/4 194.5	3.50 2.80 215
	ENGINE OPTIONS	

Type	Comp. Ratio	Bhp	Torque	Carburetor	Transmission
4-cyl. (Std.)	8.6	110 @ 3800	180 @ 2000	Single	Manual
4-cyl. (Opt.)	8.6	130 @ 4400	195 @ 2200	Single	Automatic
4-cvl. (Opt.)	10.25	120 @ 3800	202 @ 2000	Single	Manual
4-cyl. (Opt.)	10.25	140 @ 4400	207 @ 2200	Single	Automatic
4-cyl, (Opt.)	10.25	155 @ 4800	215 @ 2800	4-bbl	Either Man. or Auto.
V-8 (Opt.)	8.8	155 @ 4400	220 @ 2200	2-bbl	Either Man, or Auto.

NOTE: Regular fuel for all engines except those with 10.25 to 1 compression ratic. The latter use premium fuel.

torque tube is the unique propeller shaft, consisting of a 5%-in. diameter triple-alloy steel forging, heat-treated and shot-peened to gain high fatigue life. This shaft has a six-bolt flange for attachment to the flywheel or clutch drive shaft at the front, a splined end at the transaxle.

Guiding and centering the long, flexible driveshaft are two damper bearing assemblies bolted inside the torque tube. These consist of ball bearings, sealed and lubricated for life, press-fitted over plastic-lined steel shells. The ball bearings, in turn, are encased in a heavy rubber insulator. The shell bushings as well as the inner race of the damper bearings are closely-

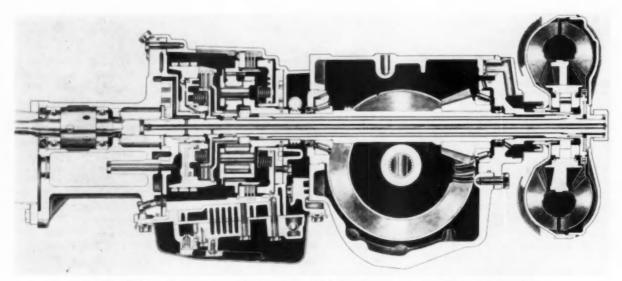
ploying the split torque principle. This is a lightweight, aircooled, three element torque converter, two-speed planetary transmission with automatic upshift depending upon car speed and throttle position. In this arrangement the torque converter is mounted on the rear side of the differential carrier. remotely from the transmission box. The drive arrangement is such that in high gear the drive is split with approximately 40-per cent of the effort mechanical, and only about 60-per cent of the torque going through the converter. It is claimed this results in a solid drive feel and minimum loss in efficiency.

Part throttle downshift is pro-

meet this problem, the Tempest has an oval-shaped reverse-flow muffler about 25-in. long. It is double-jacketed with an asbestos liner between the outer shell and wrapper. Tuning chambers are designed for optimum performance.

Tempest is equipped with fivebolt, 15-in. wheels. Tire size is 6.00 x 15-in. standard on sedans; 6.50 x 15 standard on station wagons, optional on sedans. Black wall tires are standard, white wall optional, wheel disks as well as wheel trim rings being offered as optional equipment.

The electrical system is 12-volt. Effective brake lining area—108.9 sq in, with 9 x 1.75-in, drums.



Sectional view showing automatic transmission, drive pinion, ring gear, and torque converter.

fitted on the propeller shaft and rotate with it.

The Tempest offers two types of drive: the standard synchromesh transmission and an optional automatic transmission. Because of the transaxle arrangement, the manual shift transmission is both compact and light. Too, its attachment to the differential carrier makes it practical for both transmission and axle to share the same lubricant. The manual gear shift lever is of floor type (straight stick).

When it comes to the automatic transmission, Pontiac claims the distinction of having the first torque converter transmission emvided for better low speed performance and acceleration. At speeds below 25-mph part throttle downshift to low will occur if the accelerator pedal is moved to approximately one-half throttle, later upshifting at around 35-40-mph. For maximum acceleration, full throttle downshift can be obtained at around 45-mph. Manual downshift at speeds below 50-mph also is provided. The speed selector lever, mounted on the instrument panel, provides selection of Reverse, Neutral, Drive, and Low.

Special muffling problems arise from the unconventional chassis arrangement and unitized body. To Overall steering ratio is 24 to 1 with standard manual gear or optional power steering. Rear axle ratio 3.55 to 1 standard for all combinations of engines and drive.

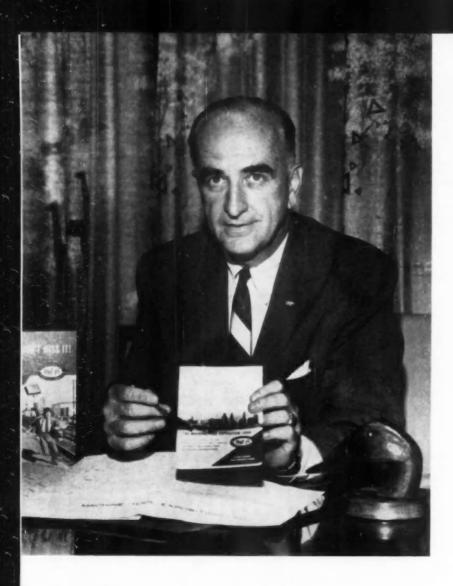
Economy has been effected on final assembly operations. While other cars with unitized bodies—of any make—require a special final assembly line, the Tempest is built on the same line as are the large cars. This is made possible by advance engineering planning. The entire chassis is assembled on the line in conventional manner, then the body is dropped over the chassis and fastened to the extreme cross-members.

AUTOMOTIVE

ONE WAY

MACHINE TOOL AND PRODUCTION EQUIPMENT ISSUE 1960

AUTOMOTIVE PRODUCTION DEVELOPMENT SECTION



Executive Vice-President
NATIONAL MACHINE
TOOL BUILDERS' ASSOCIATION

Building America's Future

HE responsibility for building America's future is shared jointly to a surprisingly large degree by the country's automotive industries and the country's machine tool manufacturers. These two fields have common functions of research and development, planning and programming operations and managing current production. Each industry contributes to the advancement of the other and jointly they have a great technical and engineering responsibility for converting the hopes and dreams of today into the production tools, techniques of manufacturing and manufactured products of tomorrow.

America's machine tool builders regard this responsibility as much more than merely an opportunity for profit-making. Just as a typical automotive products manufacturer may have as many as 1500 individual research projects moving ahead on any single operating day, the machine tool builders likewise have heavy investments in research and development which may seldom be seen by others until the final product is

displayed at such a place as The Machine Tool Exposition-1960.

The Machine Tool Builders appreciate the arrangements which are being made by manufacturers in the automotive industries to make certain that the 1960 machine tool displays, exhibits and demonstrations will be seen and studied by large numbers of the key personnel of the automotive plants. It was most gratifying to learn that a single division of one automotive company has completed arrangements to transport 1000 of its employees by bus to the Exposition. This effort of a leading manufacturer to familiarize employees in large numbers with trends in new machine tool operations demonstrates the importance of the Exposition as an educational facility. It also proves very conclusively that such a company has established a policy of welcoming the greatest possible understanding of the total potentials of machine tool modernization installation programs.

(Turn to page 140, please)

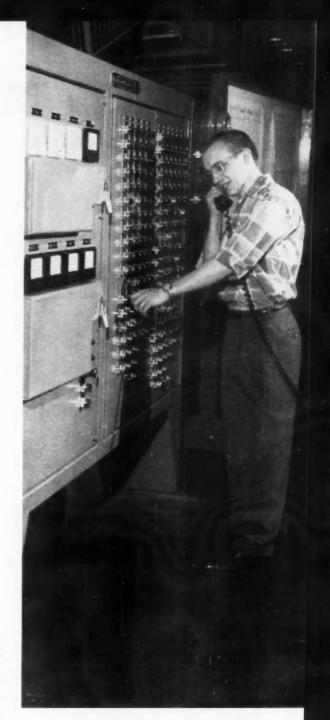
Joseph Geschelin

Automotive Industry uses of Machine Tools

THAT dramatic changes have taken place in automotive manufacturing practices becomes evident in reviewing some of the highlights between the Machine Tool Show of 1955 and the Machine Tool Exposition—1960. Preceding the 1955 event we summarized the then developing machine tool situation (see AI, September 1, 1955) and pointed to growing acceptance of transfer machines at that time. In the interim, the transfer machine in all of its endless variations has become the natural choice for most mass production operations, dominates the scene in motor car plants, and recently has invaded parts plants as well as heavy duty engine plants.

Transfer Machines Are Reliable

With increasing use and experience, the transfer machine has become accepted as a highly reliable piece of equipment, relatively free from maintenance difficulties once it has been properly tuned. Equally important is the fact such equipment now incorporates self-checking and self-inspection devices to provide a maximum degree of quality control. Supplementing these devices is the versatile Tool Board, now standard in practically all plants, providing not only freshly ground and adjusted tools for immediate use but also incorporating tool



Electronic controls simplify automated functions

- • self-inspection
- · · · tool boards
- • electronic controls
- · · · flexibility
- • idle stations
- • building block designs
- • automatic transfers
- • numerical control



Part of a control panel serving a transfer machine. Equipment of this kind permits fast changes in sequence of operations

life calibration dials arranged to automatically shut down a station or an entire section of a machine when the anticipated life of the tooling has been approached.

Versatile Transfer Machines

But there has been another important landmark. In the early installations of transfer machines it appeared that the high initial investment could be amortized only on the large volume production of a single part. Hence it appeared that installations might be limited to mass production parts in the large motor car plants.

More recently the flexibility of transfer machines has been dramatically demonstrated by the installations at Detroit Diesel and GMC Truck & Coach Division for machining cylinder blocks and heads, and other components of heavy duty Diesel engines and gasoline truck engines, respectively. In these two instances volume is comparatively low for any given part and the equipment is required to accept a variety of parts scheduled in batches. To achieve economic results, it has been necessary first to design entire lines of engines, regardless of size and number of cylinders, as integrated families with a high degree of interchangeability of parts as well as hole patterns.

Given a family of engines with a high degree of similarity as to hole spacing, the machine tool builders came up successfully with transfer machines capable of rapid changeover from one part to another. This has been accomplished in various ways—by designing interchangeable fixtures; by the addition of idle stations which could be activated by a setting on the electronic control; by an arrangement for changing the cycling of a station or an individual head simply by pressing a control button; and in other ways unique to a given machine tool builder.

The net result is the same—the development of a highly specialized mass production machine capable of handling a variety of parts (rather than a single part) with impressive economy.

The same principle has been applied to the problems of large parts makers. A good example is found in the recent installation of one of the largest integrated transfer machine lines at Saginaw Steering Gear Division. This one is for the machining of gear housings for power steering units.

Incidentally, SSG has demonstrated to their own satisfaction that the transfer machine has become a precision machine capable of producing parts to tolerances not within the capabilities of conventional machines. Part of this gain is attributed to the use of a pallet type machine in which the part is clamped securely in a massive fixture and remains on the same fixture for the duration of a complete cycle.

Machines Affect Product Design

Acceptance of the transfer machine concept has had a salutary effect on product design. First of all there is the concept of a family of parts. The more there is of interchangeability of parts and hole patterns, the easier it is to tailor a new machine with minimum investment. But there is more to it than that. Transfer machines at best involve enormous capital investment. The investment is so high, in fact, that it becomes necessary to retain the same basic machine for more than one model change. In view of this, engineering has teamed up with the production department to even a greater degree than ever before. It is now necessary for engineering to project design over a number of years in advance. They must visualize what changes may take place in engine requirements for a period of say five years ahead.

Planning for the Future

Will engines be bigger or smaller in a few years? Will the V-8 remain entrenched or will demand shift to an inline Six? In any event, whatever the product involved in the projection, engineering must decide upon the maximum limits of size to make sure that the transfer machine under consideration will have enough room between heads and under heads to handle the product of the next season or a still later season.

Transfer Machine Built to "SMTS"

This leads us to a consideration of the next generation of transfer machine design. We refer to the forward step taken by Buhr in producing in June, 1960, the first transfer machine built to the Special Machine Tool Standards developed by the automotive committee which formulated the original JIC standards. We shall refer to this as "SMTS" hereafter.

What does SMTS mean? For some time transfer machines have been described as being of module or building block construction. Practically, this meant that a transfer machine could be designed by an individual manufacturer by employing his own standard heads to integrate stations and, finally, the entire machine. SMTS, on the other hand, defines all transfer machines conforming to the standard as being composed of individual heads that have exactly the same mounting dimensions on the machine bed. Thus a machine of SMTS type will permit a free interchange of heads from one location to another. Moreover, in the event of a product change it will be possible to remove one or more heads and replace them with other heads, even if an entirely different operation is required or if a horizontal head is to be replaced by a vertical head or an angular head.

Automatic transfer of parts from one station to another, combined with automatic feeding of parts to the machine, makes the transfer machine as fully automatic in operation as any special machine can be in this automation era.

More Versatile Machines

Up to now the transfer machine has been employed primarily for such operations as milling, boring, drilling, tapping. But more recently entirely different operations have been integrated. One example is the Norton crankpin grinding line at GMC; and the Wickes crankshaft turning setup at Pontiac and elsewhere.

The next major phase of machine tool development stems from the presentation made by the user group committee at the annual meeting of the National Machine Tool Builders' Association. The user group is urging certain phases of standardization of general purpose machines, not to make different makes of similar machines interchangeable but to make it possible for machines of similar rating and similar types to accept the fixtures and tooling built for any other machine of that type. To be more specific, the users want to be able to shift a fixture, say from a K & T milling machine to a Cincinnati mill, for example, freely and without the necessity of making a new fixture. Actually, this involves a certain minimum clearance about the table and a uniformity of Teeslots and Tee-slot spacing on the table. There are other features, to be sure, but this is a major requirement.

Equipment of All Kinds

Although we have devoted considerable space to a discussion of transfer machines, this is only part of the story. After all the automotive industries use every conceivable kind of machine that can be named. We need look only at a few components such as gears, shafts, ball bearings, etc., to get the picture. Such components require a variety of special machines of many kinds. However, in modern practice a component such as an automatic transmission gear must be produced by some integrated method to achieve cost economy.

That is exactly what we have today. Consider a small planetary gear. It may start in the form of bar stock which is turned and bored and cut off in an automatic. However, all of the succeeding operations, including gear cutting, gear shaving, honing of the bore, grinding, inspection and sorting, all have to be tied together into a continuous cycle with the very minimum of manual handling.

We have described numerous lines of this character in recent years. The clue to the success of any given setup is found in the selection of the unique machine for each step; attachments for automatic feeding, loading, and unloading of each machine; and automation links—conveyors, elevators, storage and distribution units—to tie the lineup in effect into a single unified process machine.

To make the system work under control, it is necessary further to equip each machine with automatic gaging devices, first for acceptance of the part before it enters the machine, then to check the work coming out of the machine. Electronic devices generally are employed for this purpose sirce speed and precision are so vital. Such devices also incorporate feed-back so as to be self-regulating. Usually, if the control center counts one to three pieces not up to standard, it either makes a tool adjustment automatically or in some instances it will stop the machine.

(Turn to page 158, please)



A Yardstick of the Increased Productivity of 1960 Model vs. 1950 Model Machine Tools

By Charles A. Weinert

EASTERN EDITOR

Al Surveys **Machine Tool Builders** to Develop Basic Data for Use in Planning **Equipment Modernization**

ANY factors enter into considerations involving the procurement of new machine tool equipment. The primary ones, may, for example, tie in with expansion of facilities, need for increased product output, or just pure economics.

Other important factors may include the overall financial picture of the company, its sales outlook, and generally what it will take to keep competitive and "remain healthy in business."

Additional important associated items may be physical ones, such as provisions for feeding and unloading the machine, its type of control, kind of tooling to be used, and similar accessories or attachments, as well as utilization of the full capabilities of the machine in its actual application. All of these can contribute material benefits in the way of increased production efficiency.

The machine tool itself, however, is the major piece of equipment

TABLE I

1960 MODEL MACHINE TOOLS OUT-PRODUCE THEIR 1950 COUNTERPARTS AND SUBSTANTIAL PRODUCTION SAVINGS FROM MODERNIZATION ARE INDICATED

- Typical Examples of Increased Productivity -

Type of Equipment	Avg. % Increases in Output 1960 Models vs. 1950 Models*	Avg. % Savings on Product Production Cost*
Abrasive Belt Grinders	50 20	50
Automatic Screw Machines	20	50 15
Bandsaws	237	50
Bending Brakes	28	25
Broaching Machines	28 15	10
Cylindrical Grinders	22	13
Drilling Machines	34	28
Gear-Cutting Machines (bevel gear)	35**	50 25 10 13 28 15 35 10 50 18 23
Horizontal Boring Machines	65	35
Hydraulic Presses	25	10
Internal Honing Machines	55	50
Mechanical Presses	52	18
Milling Machines—vertical	28	23
Planers	20	10
Punching Machines	22 34 35°° 65 25 55 52 28 20 25 53	
Shapers	53	
Shears	25	25

^{*} Based on estimates supplied by machine tool builders. ** One builder reports productivity increases up to 400%. Further details are contained in following tables.

and therefore the "base of operations." And in most cases the prime question is whether replacement of a given existing machine with a new model will provide adequate returns in production efficiency and cost savings.

Since the machine is the foundation for such considerations—and because production equipment is an often-discussed subject — plant managers in several branches of the automotive industry have asked for basic data on machine tools that could be employed in planning modernization. For one thing, it is usable as a means of demonstrating to top management and non-technical executives the potentials for increasing productivity and reducing costs through new machine tools.

In an effort to meet this need. AI editors during the past several weeks have surveyed the machine tool builders for their best estimates of the productivity of 1960-model machines compared to that of 1950-model machines. It will be the purpose of this article to report the results.

We have chosen to present the data obtained in the form of the accompanying five tables.

Three of the tables represent consolidations and averaging-out of the estimates furnished by the machine tool builders. The other two tables, both of which are titled "Productivity Changes of Gleason Gear-Cutting Machines," are in the nature of case-history reports supplied by the Gleason Works.

In all of these tables the increased productivity, percentagewise, of 1960-model machines over 1950-model machines are indicated. The Gleason tables also include comparisons between 1960- and 1940-model, as well as 1950-model, gear-cutting machines.

It will be seen that the data obtained in this initial effort are not all-inclusive. All types of machines are not represented. But we believe the data being presented will serve as a yardstick of what to expect from present-day models.

We might also add that the data have been "pre-tested" by being shown to key executives. All expressed great interest and enthusiasm in the practical utility of the information. In every case, nevertheless, it was stated that the plant manager had some data of his own which would undoubtedly be used to supplement the survey data.

ADDED PRODUCTION EFFICIENCY METAL-CUTTING MACHINE TOOLS 1960 Models vs. 1950 Models

	% Increases in Output (Estimated)			% Savings on Product Production Cost (Estd.)		
Type of Equipment	Low	Average	High	Low	Average	High
Boring Machines: Horizontal boring, drilling & milling. Vertical boring mills, including vertical turret lathes Jig boring, horizontal and vertical.	20 20 20	65 27 81	200 32 300	15 20 15	35 20 32	75 20 60
Broaching	15	15	15	10	10	10
Contour Sawing and Filing	-	Upt	o 360	30	30	30
Cutoff; Bandsaw (including friction) Abrasive disk Hacksaw	60 10 20	237 25 53	550 40 100	40 8 25	50 Up t	60 50 50
Drilling: Sensitive (tape-controlled) Up-right: Single-spindle Gang Radial (tape-controlled) Automatic (tape-controlled)	25 15 15 20	34 23 23 27	50 30 30 40	15 5 5 15	28 15 10 20	50 25 15 25
- marianta (mpe anna strea)	40	40	40 20	30	30	30
Gear-Cutting and Finishing: Standard	100	58	150	=	=	=
Hobbing Form-milling type Bevel-gear cutters Lapping	10 10 45	20 35 45	30 50 45	10 20	15 20	25 20
Grinding: External cylindrical: Plain	10	22	30	5	13	20
Universal Internal cylindrical Centerless: External	15 10 35	22 24 40	30 35 45	10	15 20	20 35
Internal Surface Disk, horizontal and vertical Tool and cutter (including drill)	30 5 25 10	35 50 33 15	40 120 40 35	5 20 12	12 25 12	20 35 12
Contour Internal contour Abrasive belt	15 200 50	15 200 50	15 200 50	70 50	70 50	70 50
Honing: Internal (including combination External and surface	50 40	55 45	60 50	50 40	50 40	50 40
Lathes: Engine, heavy-duty: Standard. Toolroom. Manufacturing and gap. Tracer. Turret: Ram type. Saddle type. Automatic screw machines (single-spindle)	10 10 10 10 60 40 30 20	10 10 10 10 60 40 30 20	10 10 10 10 60 40 30 20	5 5 5 30 20 15	5 5 5 5 30 20 18	5 5 5 5 30 20 20 20
Milling: Bench type Knee-type: Horizontal Vertical. Automatic & Manufacturing Bed (Lincoln) type, including automatic rise and fall Planer type (including skin and spar). Profilers, duplicators, diesinkers, engravers	25 25 25 30 10 40 25	28 28 28 28 30 30	30 30 30 30 30 50 45	15 20 20 20 10 25 10	15 23 23 25 10 25	15 25 25 30 10 25 80
Pipe-Cutting and Threading	20	23	25	-		-
Planers: Double housing Openside and others	5	20 20	57 57	3	10 10	35 35
Polishing and Buffing: Polishing stands (bench and floor) Speed lathes.	50 50	Ξ	100 100	=	=	
Shapers: Horizontal Vertical, including slotters and keyseaters	30 30	53 64	100 100	Ξ	-	
Threading (except pipe): Tapping. Hobbing and milling. Grinders, thread.	20 10 50	20 10 50	20 10 50	8 5 10	8 5 10	8 5 10

TABLE II

PRODUCTIVITY CHANGES OF GLEASON GEAR-CUTTING MACHINES 1960 Models vs. 1940 and 1950 Models

111 37r

Straight Bevel

1950 (Avg)

	Pro		-				-	0000
1940 Models	Cutting	Stroke Stroke	"V" Rough	Strake Strake	Tanruf Tanruf	"V" Rough	Tanruf Tanruf	Tanruf Single Roul Tanruf Single Roll
	Cutting	77 Revex	Rgh (12 Rgh Gen.	Rgh 77 Revex Fin 12 Gen. Rgh 77 Revex	Rgh /12 Fin /12 Rgh Gen.	Rgh 112 Fin Gen.	- marine	0000
	Production/ Mach/Hour	67.0	7.5	30.6	3. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2.	3.9	0.0	0.57
1950 Models	Cutting	Revacycle Revacycle	"V" Rough	Revacycle	Tanruf Tanruf	"V" Rough	Taneuf	Tanruf Single Roll Tanruf Single Roll
	Cutting	Reva.	414 Gen.	Reva.	#14 Gen.	Gen. Gen. Gen.	424 Gen. 424 Gen.	Gen. Gen.
	02	S 8	8:4:	Ran Ran	Rap Figh	Fig.	8585	24A 24A 24A
	Production/ Mach/Hour	81.0	35.0	61.0	11.0	13.0	2.3	1.00 0.67 1.00 0.67
1860 Models	Cutting	Revacycle Revacycle	Completing Completing	Revacycle	Completing	Completing	Completing	Tanruf Double Roll Tanruf Double Roll
- THE ROOM	Cutting	#109 Reva.	#104 Gen.	/109 Reva.	/114 Gen.	#104 Gen.	#114 Gen.	24 Rougher 24A Gen. 24A Gen.
	Operation	Cut and Burr Teeth Cut and Burr Teeth	Cut Toeth	Cut and Burr Teeth Cut and Burr Teeth	Cut Teeth	Cut Teeth	Cut Teeth Cut Teeth	Rough Finish Rough Finish
	Pitch D.P.	5.0 (.400* Depth)	5.0 (.400° Depth)	4.0 500° Depth	4.0 560° Depth	6.0		1.0
	Comb.	9 .0	9 × 0	15 18 15 18	15 n	8×8	30 × 52	16 16
	Type of Gear	Differential Automotive (High Prod)	Differential Automotive (Low Prod)	Differential Truck (High Prod)	Differential Truck (Low Prod)	Mitres To 3:1 Ratio	Mitres To 3:1 Ratio	Coarse Pitch 1.800° Depth

tes: 1. Automatic loading was used, as applicable, to the differential cutting machine 2. The Revacycle machine allows burring of the teeth as a "free" operation.

160

2222 2222 22222 free-cutting material of A.I.S.I. 4620 @ rese pitch ratio which is based upon free-ma 100% efficiency.

are eptio

figures the exci

With this introduction to the tabular information, we believe it will be self-explanatory. Suffice it to say here that the indicated added productivities of new model machine tools will be found to be quite substantial.

It should be pointed out that the

true advantages for the new model machines can actually be even greater than those indicated in the tables. This is because the comparisons are based on machines in new condition. The extent of the difference, in actual practice, will obviously depend upon how much the "1950 tool" has worn and how much its efficiency and accuracy have depreciated from new condition.

Builders' Comments

As a supplement to the tabular data, comments from some of the machine tool builders are quoted in the following, including observations applying to transfer-type machines:

Milton O. Cross, president, The Cross Co.—"During the past five years, the integration of manufacturing facilities in the form of transfer machines has grown enormously. As a result, today's transfer equipment provides a return on investment far in excess of 1955.

"Not only do transfer-machine operations now include turning, broaching, milling, drilling, boring, reaming, tapping, finishing, etc., but integrated with them are a variety of assembly operations. Even production-balancing storage units have become integrated into transfer machines to facilitate combining groups of operations having different cycle times in the same machine.

"This technique—termed "Sectionizing" by Cross—also reduces machine maintenance costs. Because workpieces are banked between groups of operations, the entire transfer machine does not have to be shut down for tool changing and maintenance, thus reducing lost-time dramatically.

"Productivity has been greatly increased particularly through the development of coordinated tool programming and the use of preset tooling.

"Accuracies obtainable are far higher than anybody would have believed possible even five years ago. Contributing are not only greater rigidity but also the development of integrated gaging controls and provision of automatic inspection stations in the transfer line.

"Important, too, in modern transfer machines is the greater production flexibility they provide. Not only can they be adjusted relatively easily to accommodate part changes, but frequently they are de-

signed to handle production of several different sizes of parts interchangeably.

"Considerable progress has been made in the past five years toward retaining the initial value of special-purpose machine tools over long lives. The use of standardized components permits up-dating machines to meet changed part requirements without having to alter the basic machine. This flexibility has contributed to reducing overall production costs."

G. T. Bradner, executive vice-president, The Lees-Bradner Co.—
"The writer will answer your letter by making available to you some interesting statistics just evolved by ourselves on hob rpm and feed per revolution of representative Lees-Bradner original installation hobbing machines: the year March 1959 through April 1960 as compared with the year December 1949 through November 1950.

"For the earlier period, considering 136 (spindles) original equipment installations, average hob rpm was 146; average feed per revolution 0.056 in.

"The year just past: 230 rpm average and 0.055 in. of feed per revolution of the work.

"There is reason to believe that the curve is exponential, certainly on hob rpm. One thing not obvious from the 10-year comparison is that the most recent year showed little use of multi-start hobs—i.e. accuracy has not suffered, it's improved.

"The next 10 years (even in five years)—hob rpm's of 400/500 rpm."

M. R. Anderson, president, Michigan Tool Co.—"The last decade has probably seen the greatest advances in history in the way of processes and equipment for the more efficient production of better gears, splines, etc. The advances, moreover, cover the complete range of basic operations—roughing, finishing and checking.

"For roughing, the Shear-Speed process, in which all teeth are form-shaped simultaneously, has virtually become standard for the production of spur gears, many types of splines, and such toothed parts as transmission rings,

PRODUCTIVITY CHANGES OF GLEASON GEAR-CUTTING MACHINES 1960 Models vs. 1940 and 1950 Models

Spiral Bevel or Hypoid

1940 (Avg)

60 (Avg)

Productivity Increase of 1960 Models Over

4.0	1860					1	
	Production/ Mach/Hour	16.0 16.0 14.0 12.0/side	1.3 pairs per mach per Hour	8.8 8.5 13.0 9.0/side	3.0	1.6 pairs per mach per Hour	0.8 pairs per mach per Hour
1940 Models	Cutting	Formate Single Cycle Set-Over Fixed-Setting	No-Roll Spread Blade Fixed-Setting	Formate Single Cycle Set-Over Fixed-Setting	No-Roll Spread Blade Fixed-Setting	Spread Blade Fixed-Setting	Spread Blade Fixed-Setting
	90				/16 Hypaid	Hypoid	#16 Mypoid
	Cutting Machine	11 Finisher 11 Finisher 16 Rougher 16 Hypoid	#16 Hypoid	/22 Rougher /22 Finisher /16 Rougher /16 Hypoid	Rough Finish Rough Fin/side	Rough Finish Rough Fin/side	Rough Finish Rough Fin/side
	Production/ Mach/Hour	16.0 16.0 16.0/side	1.5 pairs per mach per Hour	8.5 8.5 16.0 14.0/side	6.1.6	2.3 pairs per mach por Hour	1.0 pairs per mach per Hour
1950 Models	Cutting	Formate Single Cycle Ratio-Control Fixed Setting	No-Roll Spread Blade Fixed-Setting	Formate Single Cycle Ratio-Control Fixed-Setting	No-Roll Spread Blade Fixed-Setting	Completing	Spread Blade Fixed-Setting
-	90		9 9	er od id	/116 Hypoid	9 9	Hypoid Hypoid
and the second second	Cutting	11 Finisher 11 Finisher 106 Rougher 106 Hypoid	#106 Hypoid or #116 Hypoid	#22 Rougher #22 Finisher #116 Rougher #116 Hypoid	Rough Finish Rough Fin/side	/106 Hypoid //106 Hypoid	Rough Finish Rough Fin/side
	Production/ Mach/Hour	23.0 23.0 23.0 23.0/side	3 pairs per mach. per Hour	8.5 8.5 18.0	5.0	3 pairs per mach.	2 pairs per mach. per Hour
1960 Models	Cutting	Formate Helixform Ratio-Control Fixed-Setting	No-Roll Single Cycle Fixed-Setting	Formate Single Cycle Ratio-Control Fixed-Setting	Cyclex Fixed Setting	Completing	Spread Blade Completing Fixed-Setting Completing
	Cutting	112 Rougher 112 Finisher 106 Rougher 106 Hypoid	#106 Mypoid or #118 Mypoid	#22 Finisher #16 Rougher #116 Hypoid	#22 Cyclex	₹106 Hypoid ∉106 Hypoid	#116 Mypoid
	Operation	Rough Finish Rough Finish/side	Rough Finish Rough Finish-side	Rough Finish Rough Finish/side	Cut Teeth Rgh & Fin Coast Side, Finish Drive Side	Cut Teeth	Cut Teeth Rgh & Fin Coast Side, Finish Drive Side
	Pitch D.P.	0.9	0.0	4.0	9.0	7.0	3.0
	Comb.	0 × 40	10 × 40	80 × 80	8 × a	40 20 20	1× 52
	Type of Gear	Automotive Main Drive (High Prod)	Automotive Main Drive (Low Prod)	Truck or Tractor Main Drive (High Prod)	Truck or Tractor Main Drive (Med. Prod)	Mitres to 3:1 Ratio	Mitres to 3:1 Ratio

Notes: 1. The production advantages of the new Gleason Hardac Cutters have been included in a study. 2. The United Cutting Method which was developed during the Years 1995-67 is extremely advantageous for very small lof quantities or prototype work because of the minimum number of cutters required. This method is adapted to the Nos. 105 and 118 Hypoid Generalbura.

method of cutting is similar to the Unitool method, but is adaptable to

athed produces theoretically correct conjugate gear teeth, based upon a 100% efficiency factor. Cutting times wer material with a 160-190 Brinell hardness and a free-m

Cutting Methor figures are based. S.1. 4620 ma

80

clutches, etc. With productivity still going up, a new twin-column design of machine has increased chip removal facility, simplified automation and provided greater rigidity. With new developments under way it is likely that this process may be adapted in the not-too-distant future to production of helical gears.

ADDED PRODUCTION EFFICIENCY METAL-FORMING MACHINE TOOLS 1960 Models vs. 1950 Models

	% In	% Increases in Output (Estimated)			% Savings on Product Production Cost (Estd.)		
Type of Equipment	Low	Average	High	Low	Average	High	
Bending and Forming (Power):							
Bending rolls, sheet and plate.	25	63	100		- 1		
Bending rolls, bars and shapes	25	63	100		- 1		
Bending brakes	25	28	30	25	25	25	
Hydraulic Presses:							
Vertical, single-action	20	25 25	30 30	10	10	10	
Vertical, double- and triple-action	20	25	30	10	10	10	
Extrusion (f. om hat billets)	30	48	70	-	-		
Mechanical Presses (Power):					1		
Inclinable, single-action (including inclined	10	52	100	10	18	25	
Vertical, single-action:	100		***				
Straight-side (including arch)	10	44	100	10	18	25	
Gap or C-frame		44 35	100	10 25	18	25 50	
Adjustable bed	25	35	50		38	50	
Double- and triple-action	30	800	50	25	38		
Progressive die	100	58	500		-		
Multiple transfer	10	58	100	-	-		
Punching and Shearing:					- 1		
Punching (including turret	20	25	30	-	- 1		
Plate and sheet shears		25 25	30	25	25	25	
Bar and angle shears	50	50	50	60	60	60	

TABLE V

"In contrast to the greater cutting demands on Shear-Speed machines is the development and rapid adoption of cold-rolling of toothed forms—particularly splines. This "Roto-Flo" process has made possible the production in seconds, instead of minutes, of splines, grooves, threads—sometimes even in combination in the same machine stroke.

"In the gear finishing field there have recently been two major forward steps. Gear shavers can now be set up by the simple use of dials and can be set to produce gears with almost any amount and combination of crown and taper. To further improve gears after hardening, while removing any nicks or burrs resulting from handling, are the new abrasive gear finishers using plastic base gear hones. For these we have now developed new types of plastic resins which more than double tool life.

"Fully automatic form grinding of externally and internally toothed parts has come to the fore recently, new machines being continuous cycling with automatic dressing and center-distance controls. These machines can produce crowned—even 'spherical'—gears, as well as straight forms."

Richard J. Reif, advertising

manager, The R. K. LeBlond Machine Tool Co.—"Based on the engine lathes we manufacture, there has been an approximate increase of 100 per cent horsepower into all base classes of machines. Using this assumption on metal removal rate, we could say that the 1960 output per machine is approximately twice that of the 1950 comparable mcdel."

R. A. Kemman, sales manager, Machine Tool Division, Besly-Welles Corp.—"We feel that significant gains have been realized because our modern machines are able to produce closer tolerance work, not only at a faster rate but by eliminating a number of passes required to produce the finer finish.

"In some cases our latest model disc grinders are producing parts on a production basis to lap tolerances. This of course eliminates the slow costly lapping operation, and here it would be very difficult to estimate the savings. It would be several hundred percent.

"Certainly there have been tremendous gains in the last 10 years. We are now quoting machines to hold dimensions in millionths where 10 years ago we were reluctant to talk about tenths.

"My point is that not only is increased production important, but increased accuracy is also an important factor."

Merrill Ridgway, sales manager, The Minster Machine Co.—"The productivity increase in the last 10 to 15 years on presses has been too great to present in a short summary. The increase in progressive die operations and the speed at which these tools run has been phenomenal. Production increases of 200 to 300 per cent are an every-day occurrence.

"The production increases to which we refer apply to inclinable, C-frame, and progressive die presses. At the present time the production of progressive die presses is very great. Please note we have indicated that production increases of 100 to 500 per cent are common.

"We cannot estimate a percentage of saving in the final production cost without being very general. It would be safe to say the direct labor saving in the majority of cases is sufficient to justify paying for the higher production press in 12 to 18 months. This figure is conservative."

Hi-E Machining

In the opening paragraphs of this article we spoke of "utilizing the full capabilities of the machine in its actual applications" as being one of the many factors involved in a new machine proj-

How to determine whether a machine tool is being worked at its top efficiency is not usually an easy task.

General Electric Company's Metallurgical Products Dept., Detroit 32, Mich., has made such computations much easier by just recently coming up with a simplified program approach, utilizing specially-developed work sheets. formulas, and slide-rule. Essentially, it is a method for achieving high-efficiency machining by determining the cutting speed which gives either the lowest cost per piece machined or the maximum production rate under a given set of work conditions. It is worth looking into.

AUTOMOTIVE

ONE WAY

MACHINE TOOL AND PRODUCTION EQUIPMENT ISSUE 1960

MACHINE TOOL EXPOSITION SECTION



MAKING PRODUCTION PAY

Scene of The Machine Tool Exposition-1960 is Chicago's International Amphitheatre which comprises five adjacent exhibit halls. These are fleft to right): North Hall, the Arena, South Hall, Exposition Hall, and (new for 1960) Donovan Hall. All machine tool exhibits will be at ground floor level. The 2nd floor of North Hall will house exhibits of oil companies, tool manufacturers, and metalworking publications.

THE MACHINE TOOL EXPOSITION-1960

International Amphitheatre, Chicago-September 6-16

THE big event is just about "ready for the road."

More than 1000 of the newest in American-made machine tools will be on display next week for The Machine Tool Exposition—1960, in Chicago's International Amphitheatre. Most of the equipment was built specifically for first-showing on this occasion.

Sponsored by the National Machine Tool Builders' Association, the Exposition will carry out the theme "Modern Machine Tools-Production Efficiency." Recent technological advances in plant equipment for increased productivity and cost reduction are to be very much in evidence.

Altogether, 144 exhibitors are slated to display their new machines and products. Among these, 122 are machine tool builders and members of NMTBA. The remaining exhibitors are firms serving the machine tool industry, such as oil companies, tool makers, and metalworking magazine publishers (AUTOMOTIVE INDUSTRIES included).

Visitors will see a large and impressive exhibition of machine tools at this quinquennial exposiBy Charles A. Weinert

tion. It is the sixth event of its kind, the last one being held in 1955 and subsequent ones scheduled for only once every five years.

Total floor area occupied by the 1960 Exposition is close to 12 acres. The addition of Donovan Hall to the Amphitheatre since the 1955 show has made available an increased exhibit space of about 80,000 sq ft for this greatest and largest event.

All machine tool exhibits are located on the ground floor level. The five continuous display halls—lower North and South Halls, the Arena, the Exposition Hall, and Donovan Hall—provide the overall impression of a gigantic machine shop with the addition of colorful decorative effects.

Practically all of the brand new machines will be in operation, and during the course of the exhibition they will machine or form tons of metal.

Much of the equipment will have automatic controls and devices, including tape and memory circuits, which minimize setup and machining times. Beyond this, the basic machines generally have been freshly-designed or redesigned with the power, rigidity and precision considered essential for increased output and close-tolerance work.

The exhibits of the 22 oil companies, tool makers, and publications are located in Upper North

Show hours are 10 AM to 5:30 PM daily, Tuesday, September 6 through Friday, September 16 (except Sunday, September 11).

The American Machine Tool Distributors' Association will maintain an information and message center at the Amphitheatre, with five telephone connections at strategic locations in the Exposition. This center will be located opposite the registration area in Upper South Hall.

Well over 125,000 top executives, production men, engineers and purchasing officials are expected to attend the Exposition. Prominent among these will be large delegations from automotive companies.

The machine tool equipment on display is previewed in the accompanying "Exposition in Print."

FOR ADDITIONAL INFORMATION please use reply card at back of issue

By C. J. Kelly
ASSISTANT EDITOR

KINGSBURY MACHINE TOOL CORP.

DRILL HEAD—This angular feed drill head is designed to make possible a drilling operation at a fixed angle. It is driven by a model 16 drilling unit. A special head is designed for each application following the same basic design. The quill



feeds the head forward until it hits a stop. The head shown has an angular drill bushing that feeds forward into a large hole. As the quill continues to feed forward it causes, through linkage, the tool in the head to feed forward in the bushing. Booth 731.

Circle 30 on postcard for more data

NATIONAL AUTOMATIC TOOL CO., INC.

DRILLING-TAPPING MACHINES—Two versions of the new FB line will be displayed. These are large vertical machines with provision for both drilling and tapping in the same head. Electric clutches in the neck permit shifting from drilling to tapping spindles or vice versa without delay. The F4B machine on exhibit has a 30 by 54 in. drilling area and delivers 30 hp and 25,000 lb thrust at the spindle. It is equipped for demonstration with a 3-station rotary table. Other sizes of these machines are available with many options.

Circle 31 on postcard for more data

HANNIFIN CO.

HYDRAULIC PRESSES—Among the new developments to be seen at the forthcoming Exposition will be new high-speed hydraulic assembly and trimming presses, products of Hannifin Company. In all, nine will be displayed, and two of these presses will be in operation producing actual parts. In addition, several models of Air Presses and "Hy-Power" hydraulic punching and riveting equip-

ment will be on display. One of the production presses will be used in the press fit assembly of back-up washers on leak-proof straight thread fittings. This operation will demonstrate the advantages of hydraulic presses as a means of increasing productivity. Another of these presses will demonstrate a trimming operation of die cast parts at unusually high speeds. Booth 652.

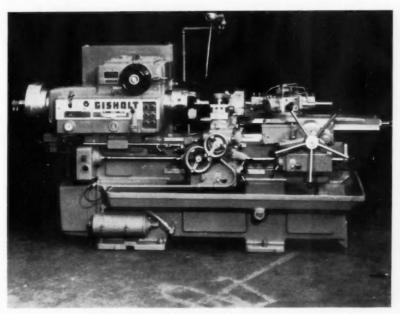
Circle 32 on postcard for more data

GISHOLT MACHINE CO.

TURRET LATHE — This machine will be equipped with a JETracer attachment on the rear of the bridge-type cross slide. It will be tooled to alternately perform first and second machining operations on steel outer flange support castings. Standard machining will be handled by tools on the hexagon turret and front of the cross slide. Contouring will be handled by the JETracer. Also this will be the first public showing of the new Gisholt MASTERLINE AR turret lathes. This new type lathe is

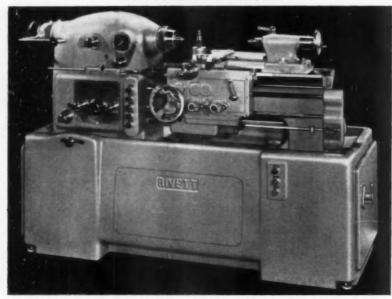
the "work-horse" of the shop "gone automatic." Combining automatic cycle efficiency with the versatility and quick setup of the hand-operated ram-type turret lathe, the automatic cycle frees the operator to handle another machine or do other work, for greatly increased productivity. High accuracy and more consistent quality is obtained along with maximum tool life since optimum feeds and speeds are pre-set for the entire run. Booth 1042.

Circle 33 on postcard for more data



Two turret lathes will be demonstrated in first and second stage machining operations

RIVETT LATHE AND GRINDER, INC.

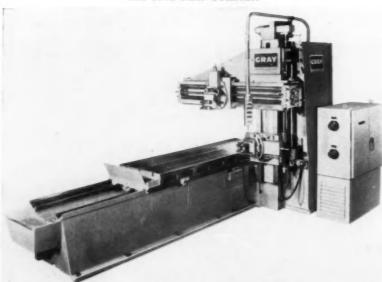


LATHE—This precision toolroom lathe has been designed to serve two purposes—an instrument lathe and an engine lathe. This double duty machine combines the sensitivity of an instrument lathe with the ruggedness required by carbide cutting tools. It is reported to be capable of turning tolerances within 0.0004 in., and will cut 1/4 in. of cold rolled steel at 0.020 in. feed. It is available in 20 and 30 in. centers.

Booth 1210.

Circle 34 on postcard for more data

THE G. A. GRAY COMPANY



Known as the Flying Scatt, this unit has all the latest features for modern high speed carbide planing. Table speeds range from 30 to 300 fpm; 60/75 hp variable voltage drive produces 10,000 lbs table thrust. The openside feature facilitates the handling of unusual jobs. Optional duplex tables reduce set-up time, and either single or double cutting heads, or any combination of both are available.

Booth 1350.

Circle 36 on postcard for more data

NATIONAL BROACH AND MACHINE

GEAR MACHINES - Six new Red Ring machines that will be on display and in operation for the first time are: a model GCX-24-in. rotary gear shaving machine; a model GHD-12-in. gear tooth honing machine; a pot-type broaching machine; a model GSC-10-in. gear speeder with broadband electronic amplifier; new designs of models GRH and GRJ low-cost gear rolling fixtures with charting equipment and a new model PCB involute checker. Also on display in the National booth will be a model GCU-12-in. rotary gear shaver equipped with a rocker-type loader, a model GCU-12-in. rotary gear shaver equipped for semi-automatic checking of size on helical pinions. BOOTH 1430.

Circle 35 on postcard for more data

MICHIGAN TOOL CO.

GEAR GRINDER—Featuring several machines never before exhibited, Michigan's display will have all equipment in operation. The newest machines are the model 870-A Mark II Universal shaving machine, the model 3053 feed-through shear-speed gear shaper and the model CGG 16x18FA crown gear grinder.

Also on display will be one of the new deburring and chamfering machines, the series 482-A for spur and helical gears. The gear shaper has been designed to meet the needs of automation lines. Its open-back two-column design permits through-feed and reduces cycle times.

Other design features have been added to increase accuracy and flexibility of operation. The deburring and chamfering machines operate on semi-automatic cycles. Two reinforced grinding wheels, powered by air turbines, are counter-balanced to follow edge contours of both tooth faces simultaneously. The gear-reducer cycle can be preset to drive the gear being finished through the proper number of rotations to achieve the required degree of chamfer.

Shown by the Gear Grinding Machines Division, the new model CGG 16x18FA crowning gear grinder is fully automatic, including the wheel dressing cycle. After a 'rough grind' cycle is complete, the gear is automatically semi-finished and/or finish ground, with all grinding rates preset. BOOTH 945

Circle 37 on postcard for more data

AUTOMOTIVE INDUSTRIES, September 1, 1960

EX-CELL-O CORP.

CONTOUR PROJECTORS — Ex-Cell-O will present its entire line of contour projectors in six models ranging in screen size from 8 to 30 in. Featured in this Exhibit will be the model 14-5 with a 14 in. screen. Versatile and accurate to tenths, its "heart" is the optical system designed and manufactured by Eastman Kodak. Coated "Ektar" lenses in the optics and the "Fresnel" lens behind the screen guarantee bright, glare-free images under normal room illumination.

Most important is the fact that Ex-Cell-O Contour Projectors afford the operator the largest staging area with plenty of room to measure large objects.

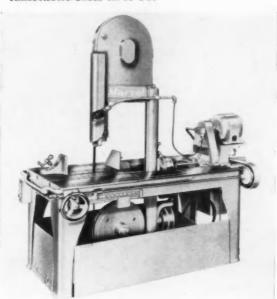
Featured also in this Exhibit is the model 30 with drop front, developing a staging area that will accept and measure parts up to 12 in. in dia. BOOTH 946

Circle 38 on postcard for more data

ARMSTRONG-BLUM MFG. CO.

METAL CUTTING SAWS-Tons of steel will be sawed in the booth which houses the 14 Marvel saws that are to be demonstrated at the Exposition. Shown will be from what is claimed to be the largest hack saw in the world down to small dry cutting models. Shown here is the model number 8 mechanical band saw which is proficient in many operations such as: cut-off, slot, shank. cope, notch, miter and cut angles without moving the work. The capacity of this unit is 18 by 18 in. Booth 1340.

Circle 39 on postcard for more data



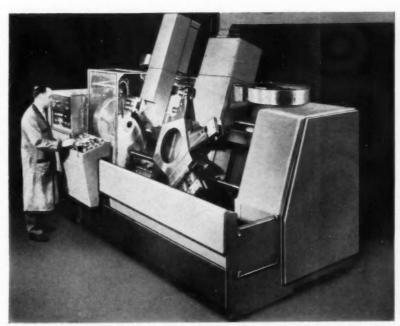
THE WARNER AND SWASEY CO.

ing point of the contour. When the machining cycle progresses up to that point, the memory unit automatically cuts in tape operation, and the machine proceeds with the contour in correct orientation to other

dimensions. Since the memory is absolute, the tape contour can be referred at any time to an absolute position to maintain accurate relationships. Booth 451.

Circle 40 on postcard for more data

TURRET LATHE-A new 25 in. swing numerically controlled turret lathe, featuring an electronic "memory" system designed to store and recall operational commands of any machining setup, has been developed by Warner & Swasey. Known as the Servofeed turret lathe, the new machine is completely electrically controlled. Its built-in memory system can assimilate up to 96 consecutive commands; each command handling any machine function such as speed change, start rapid traverse, etc. Equally important, any command contained in memory can be changed at any time without disturbing other commands. Operation of the Servofeed lathe memory system requires no tape or other outside programming. The machine operator pushes a button at the end of an acceptable cut during setup. Actuation of the button causes pertinent factors such as the feed, speed, start-of-cut, length and dimension on the work to be automatically inserted into the machine's memory in the form of commands. These commands then can be used to control machine operation automatically on succeeding pieces in the lot. An incremental tape path-control system, used exclusively for contouring, supplements the lathe's basic memory control. Here the memory which is "absolute" is used to establish the precise start-



With this control arrangement, according to Warner & Swasey, no tool drift or accumulated electronic losses can affect the position of the contour on the work. The location of the contour is always exact in relation to all other cuts.

VAN NORMAN MACHINE CO.



The control panel on this unit is conveniently located above the rear of the machine and is equipped with a disconnect switch, variac controls, a cycle on-off selector switch, a grinding wheel control and an emergency stop.

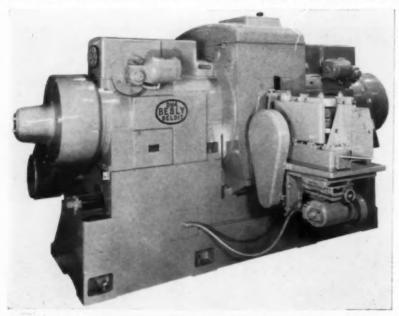
RACE GRINDER - This precision ball bearing race grinder has been designed to grind inner races of miniature bearings to tolerances of less than 50 millionths of an inch with approximately a three or four microinch finish. Called the Lectro-Cam Model 1-M super precision ball bearing race grinder, the unit has produced bearing races to 7ABEC tolerances on a 62 thousandths dia OD with a ball radius of 0.0165. The design of the 1-M race grinder was based on recommendations of major bearing manufacturers, which revealed the need for a machine that would be compatible in size to the part being ground; that would be as mechanical as possible so as not to require specialists for servicing; and that would feature simplification and standardization of tooling to enable set-up time to be reduced to the absolute minimum. Booth 351.

Circle 41 on postcard for more data

BESLY-WELLES CORP.

GRINDING MACHINE—This machine can be tooled to grind such parts as the parallel faces or ball bearing rings, piston rings, seal rings, valve seat inserts and many parts on compressors and hydraulic

pumps such as valves, pump bodies and cylinders. Actually most any part having two parallel surfaces to be ground, and requiring high production should be ground on a Besly Double Spindle Grinder. Booth 251.



Designated the DH-4, this machine features simplified push-button operation, accuracy to tenths, simple 3 stop abrosive change, automatic dressing and sizing, centralized one-shot lubrication, and an improved coolant system. Additional features include built-in dials, indicators, and gages.

Circle 42 on pestcard for more data

MINNEAPOLIS-HONEYWELL REGULATOR CO.

CONTROL SYSTEMS—A series of advanced new automatic control systems will be introduced at the show. Included are both numerical tape and automatic tracer control systems that are capable, company officials said, of automating virtually any machining operation.

Their electrohydraulic control systems are described as highly versatile, economical and easy to operate and program. The systems will be displayed by several different manufacturers on a variety of machine tools.

They were developed as a result of five years of Honeywell research and engineering and represent a major expansion of the firm's marketing activities in the machine tool industry, said Tom Sergeant, Honeywell's machine controls market manager.

An attractive console containing all necessary indicating lights, meters and operating controls is used with each of the new machine tool control systems. The consoles are completely transistorized and utilize modular construction techniques to simplify maintenance and keep machine "down time" at a minimum. Each of the firm's new control systems can produce parts at accuracies of 1/1000th of an in.

Circle 43 on postcard for more data

AMERICAN STEEL FOUNDRIES— ELMS KING DIV.

BORING MILL—Cost-reducing productivity in boring mill operations and hydraulic press applications is the theme of this exhibitor's display. Thirteen machines in operation—some producing actual parts—will demonstrate the firm's completeness of standard lines, as well as advanced engineering in specialized designs to meet specific requirements. Latest developments in automation of vertical boring mills is shown in a production machining setup on a 46 in. vertical boring and turning machine.

This new machine features the "Ultramatic" programming device which provides complete automatic control of a full cycle of machining operations. The sequence of movements for each head on the machine is set up on an individual "patchboard" by means of jumper cords. The boards are then placed in the control console which contains the automatic cycling electrical controls. With patchboards and tools in place, stop blocks are set on vertical and horizontal rod assemblies which control the corresponding movements of each head.

The full cycle—including feed selection and change, speed selection and change, head movements, turret indexes, coolant pump on and off and all other necessary functions for machining—is thus automatically controlled. BOOTH 1406

Circle 44 on postcard for more data

KENT-OWENS MACHINE CO.

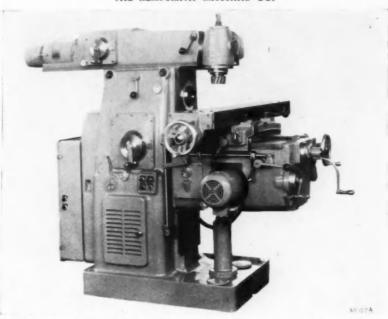
MILLING MACHINES — Additions of its line to include a mill with 24 in. table travel and improved features for performing milling operations will be introduced and demonstrated at the Exposition.

The new 2-24 and 2-24 DS (double spindle), like the balance of their line, are of the same design. Added features include improved hydraulic control for both climb and convention milling—feed rate controls with built-in heat compensators resulting in a more constant feed.

The machines have 24 in. table travel, 48 by 12 in. table, and full automatic table cycle. The mills are furnished with a 5 hp spindle motor as standard, or 7½ hp optional. The 2-24 DS will be shown complete with tooling. BOOTH 547

Circle 46 on postcard for more data

THE KEMPSMITH MACHINE CO.



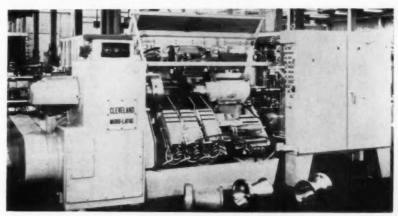
MILLING MACHINE—The Motorized Ram, a new feature on this unit, is driven by a 3 HP motor with the electrical controls at the front and rear of the machine; electrics interlocked to separately motivate the head, the machine spindle or both together. It incorporates a dial selector speed change mechanism with 8 changes and ranges of 50 to 2250 RPM. Other features include a number 50 National Standard taper, wormwheel adjustment, lubrication by pressure oil system and an electric magnetic brake. Booth 347.

Circle 45 on postcard for more data

CLEVELAND HOBBING AND MACHINE CO.

LATHES—This line of Modular Machines is a combination of many production proven components that universally unite with any one of four headstock combinations and six beds to create the following type of machines: profile lathes for both 180 and 270 deg configurations; turret lathes; pedestal lathes; automatic bar and chucking production lathes;

(with or without profiling); production lathes; threading lathes; qualifying lathes; stub lathes; and many other combinations. Available in bed lengths up to 140 in. these obsolescent-proof machines can be custom tailored specially for any job. Three Modu-Lathes and a complete display of components will be on exhibit.



Machines designed to specifications that are reported to be obsolescent proof
Circle 47 on postcard for more data

THE CARLTON MACHINE TOOL CO.



DRILLING AND BOR-ING MACHINE - A tape control system, directs the table movem ent longitudinally, and the head motion transversely. The speed and feed preselector is also controlled by tape. The table has a working area of 66 by 96 in., with a 25,000 lb capacity. The maximum distance between the table and spindle is 50 in. with a 38 in. vertical adjustment to the rail. There are 36 spindle speeds and 18 power feeds, which can cover a wide range of hole sizes. Booth 849.

Circle 48 on postcard for more data

REED ROLLED THREAD DIE CO.

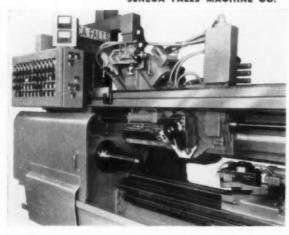
THREAD ROLLING MACHINE—Model A25 is a simplified thru-feed thread rolling machine designed to handle bar lengths to 20 ft and dia to 2½ in. OD. The stress ring in the A25 is of new design and is extremely rigid. This minimizes spring during heavy rolling loads. Antifriction bearings are generously used throughout resulting in maximum HP being available at the dies. Skew adjustment is accurate to 20 seconds of arc 0.001 in., simple to use and not



influenced by other adjustments. The sizing adjustment is read directly in 0.001 increments off the large size adjusting ring, making it very easy to control to close tolerances. For fast, accurate setup, die matching is accomplished by the long proven match cup system. For convenience, a light is built into the die matching compartment. Hydraulic system for opening and closing of dies is available when necessary for threading close to shoulders. Booth 421.

Circle 50 on postcard for more data

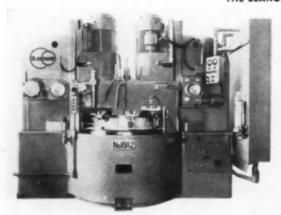
SENECA FALLS MACHINE CO.



TRACER LATHE - In operation at the Expo-sition this model "LQ" automatic tracer lathe will be machining front spindles. machine is equipped with a rear tracer carriage mounting an automatically tool block, a left hand overhead tracer carriage, and a front squarattachment carrying a thread rolling tool. The rear tracer tools rough and finish turn the stem end of the spindle and the inspindle face. Booth 231.

Circle 49 on postcard for more data

THE BLANCHARD MACHINE CO.



The 18-A2 Grinder is a new two-spindle automatic surface grinder. This new grinder is of a "dry base" design: in operation all coolant and chips flow out of the grinder to an outside settling tank or central coolant system. The design of this grinder provides easy access to the grinding wheel area. All controls are interlocked to assure complete safety.

Circle 51 on postcard

for more data

SURFACE GRINDER-This grinder has a plain table for mounting of special work-holding fixtures, and a six speed gear box for table rotation, with provision for locking this in a pre-selected speed. The feed rate in thousandths of an inch per minute can also be locked up by the set-up man. The grinder to be shown at the Exposition will have an eightstation fixture, each station handling a different work piece. This table will be rotating to demonstrate clamping and unclamping of the work-holding fixtures, and to show the path of the work pieces through the grinding wheels and under the wheel control calipers. Booth 1209.

GREAVES MACHINE TOOL CO.

MILLING MACHINE—Featured in this booth will be the Scan-O-Matic milling machine. Basically, in this system the tracing stylus automatically follows the contour of a master regardless of whether it has straight walls, angles, or curves to be cut. With the system being completely automatic, the deflection of the stylus always remains the same. Constant torque hydraulic motors provide the rotary power.

Adjustable stops, operable from either the motion of the table saddle or the motion of the knee, trip the table reversing valve at the end of each stroke and at the same time an indexing motor crossfeeds the work for a new cut. The knee is operated automatically vertically by use of a hydraulic cylinder. Since the reversing valve can be actuated from a vertical, as well as a horizontal motion, the stops can be set to the trip when the tracer strikes the wall of a cavity or a core, eliminating climbing of walls when desired. BOOTH 1439.

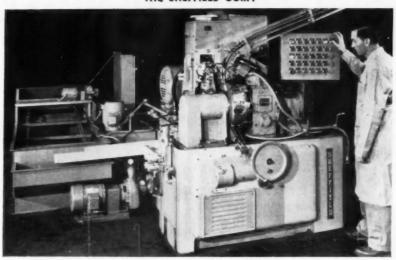
Circle 52 on postcard for more data

DANLEY MACHINE SPECIALTIES, INC.

PRESS EQUIPMENT - A complete automatic high production coil fed press and auxiliary equipment will be the main feature of the Danly booth. The installation will feature a 400-ton Autofeed press, complete with a slide cushion, a skip type scrap cutter, a grip feed, adjustable while in motion, and a coil loading car. A platform and ramp will be installed around the display to enable visitors to view the operation of the press at close hand. The press will be equipped with the latest developments in controls and accessories, including the Danly slide positioner, load indicator, and die light. A 100-ton OBI will also be displayed. This press will feature a static press control and eddy current drive control. The OBI will represent the complete range of 25- to 200-ton OBI presses which were introduced to the industry within the past two years. To highlight its expanding operations in the field of hydraulic presses and equipment during the past several years, this exhibition will display a 100-ton hydraulic piercing machine equipped with the latest electrical design features. BOOTH 1250

Circle 54 on postcard for more data

THE SHEFFIELD CORP.



The initial introduction of this machine will be a feature in the Sheffield area

GRINDING MACHINE—The model 182 Crushtrue multi-form grinder is a new machine to automatically grind cylindrical forms and grooves on two or four parts simultaneously at wheel speeds of 9200 sfpm. The machine will be demonstrated publicly for the first time at the Exposition and will be performing the following grinding operations. Two piston rod shafts, each approximately 3% in. long with a % in. dia flange at one end of the 14 in. dia stem, will be fed into a rotating cage at the front of the

machine for indexing into grind position. Both shafts will be ground simultaneously with one being located above the centerline of the Crushtrue dressed grinding wheels and the other below. Then the rotating cage indexes both parts to the unloading chute. On this application, the machine will grind from the solid a ½ in. wide groove to 0.0425 in. deep on the head of the piston rod shaft and on the stem a 1/16 wide undercut to 0.010 in. deep. Booth 201.

Circle 53 on postcard for more data

GREAVES MACHINE TOOL CO.

MILLING MACHINES
—Number 2-H is the designation given the milling machines to be displayed at the exposition by Greaves. This line features 18 speeds ranging from 25 to 1250 rpm, with all speeds reversible. The 18 feeds range from 1/2 to 30 ipm, with a rapid traverse of 75 ipm. A triple V-belt drive is incorporated along with a 5 hp, 1750 rpm motor. The maximum travel employed with this unit is 28 in. The table measures 53 1/4 in. Booth 1439

Circle 55 on postcard for more data



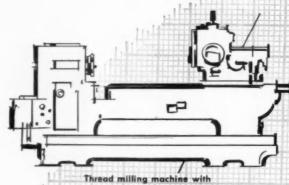
See these new Sundstrand

AT BOOTH No. 1014

Machine Tool Exposition, September 6, 1960 International Amphitheatre, Chicago, Illinois

See these new cost reducing Sundstrand machines for milling, turning, grinding, broaching, drilling, and thread milling operations. See ease of set-up, adjustment, and numerical controls for small lot work . . . automatic cycling and multiple spindle precision machining for high production.

Visit booth 1014 . . . See how Sundstrand's new machines and "Engineered Production" methods can save time and money for you.



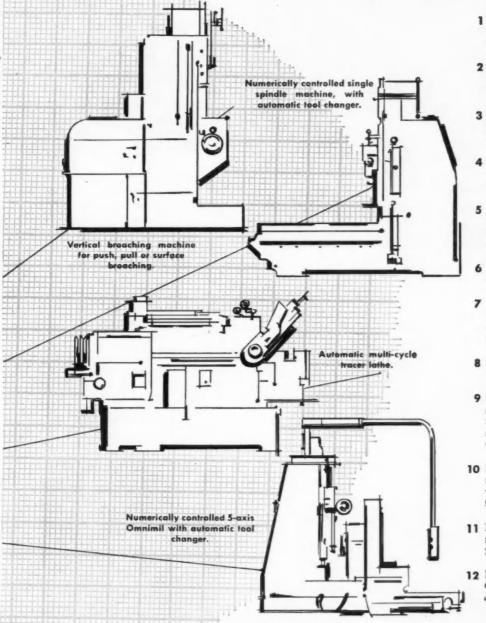
sine bar adjustment.



MT=PE

Modern Machine Tools = Production Efficiency

Machines in action..



- 1 Three axis numerically controlled vertical spindle machine with 20-position tool changer.
- 2 Precision multiple spindle drilling, boring, reaming or tapping machine.
- 3 Automatic universal threadmilling machine has simple dial setting . . . no cams to change.
- 4 Vertical knee-type milling machine has precision angular boring or milling spindle.
- 5 Multi-cycle tracer lathe with indexing turret for ruff and finish cuts and cross-feeding slide for facing cuts.
- 6 New design multiple-tool automatic lathe.
- 7 Vertical broaching machine has "building-block" principles for easy conversion to pull-up, pull down or surface broaching.
- 8 New conveyor type abrasive belt grinder.
- 9 New centerless abrasive belt grinder, with micrometer infeed of regulating wheel, assures precision size control of work 1/4" to 41/2" diameter.
- 10 Rotary surface grinder has automatic cycling for production work and convenient controls for precision tool room grinding.
- 11 New universal bed-type Rigidmil with 50 h. p. horizontal and 20 h. p. all angle head.
- 12 Numerically controlled 5-axis Omnimil, with 60-unit tool

. DIVISION OF SUNDSTRAND CORPORATION







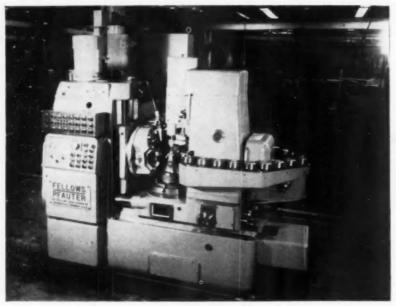












This is the first American built Fellows-Pfauter hobbing machine

THE FELLOWS GEAR SHAPER CO.

HOBBING MACHINE — This exhibit will comprise an almost complete line of machines and instruments for the production and inspection of gears. The machines will include the first American built Fellows-Pfauter Hobbing Machine, a gear finisher, a gear grinding machine, two latest type gear shapers and a new helical cutter sharpening machine with hydraulically operated automatic feed and wheel truing.

Seven of nine gear measuring instruments which will be shown have electronic recording equipment. The two without recorders are small bench-type center distance measuring instruments for fine-pitch gears. One No. 4 fine-pitch red liner, for making composite checks on fine-pitch gears, records errors at a magnification of 1600 to 1. Another is arranged for checking with a single convolution worm at a high-speed recorder which can be operated at 250 to 1, 500 to 1 or 1000 to 1 magnification. Booth 929.

Circle 56 on postcard for more data

with constant clearance angle and tool tip radius, produced in true radius tip grinding is ideal for contouring work. The model 4 tool sharpener combines adjustability of

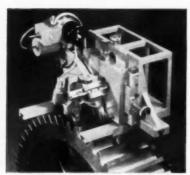


the axis of tool holder oscillation with an additional fine radius vertical setting to grind true-radius. Tool reciprocation is completely automatic and setup and operation extremely simple. Booth 924.

Circle 58 on postcard for more data

ILLINOIS TOOL WORKS

MEASURING INSTRUMENT—
This unit was designed for testing large, heavy production gears. It weighs approximately 20 lbs and is portable. It can be carried to the production machine for in-process checking, and also permits gear checking in operation. The unit is designed to locate directly in the gear teeth by means of three ball feet which provide a tripod mounting ar-

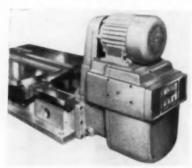


rangement. In operation, a powered indicator follows the theoretical involute path through contact with a variable cam. The indicator finger measures any deviation of the gear tooth from the true involute curve. The instrument is independent of diametral pitch and therefore will check any involute gear, either spur or helical, from 24 to 200 in. base diameter. Booth 242.

Circle 59 on postcard for more data

BARNES DRILL CO.

MECHANICAL UNIT—For drilling applications a new high capacity mechanical unit will be displayed for



the first time. Designed with a thrust capacity of 30,000 lbs, the new unit can be incorporated in a com-

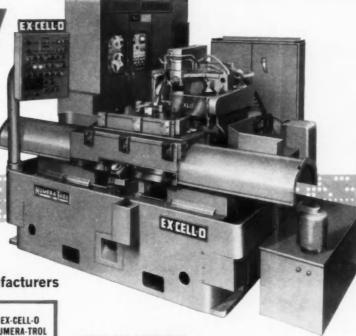
plete range of horizontal and vertical applications. To achieve high efficiency, the unit has been designed with a planetary type, all spur gear drive. No right angle drives are used. A full set of pick off gears will give variable feed rates. The spindle motor can be furnished with output up to 30 hp to meet varying job requirements. The unit is powered by a 2 hp feed motor, and it will be mounted on 18 in. ways or wider. Booth 152.

Circle 57 on postcard for more data

THE HEALD MACHINE CO.

TOOL SHARPENER—This device permits either elliptical or true radius tip grinding or carbide or high-speed steel cutting tools. The conical shape,

a study in time



How Ex-Cell-O Numera-Trol
Cuts Costs for Three Modern Manufacturers

Part: TEMPLETS	CONVENTIONAL METHODS	EX-CELL-O NUMERA-TROL	
Lead time	128 hrs.	16 hrs.	
Grinding per/piece	60 hrs.	6 hrs.	
TIME SAVED	166 HOURS		

CONVENTIONAL METHODS	EX-CELL-O NUMERA-TROL
150 hrs.	40 hrs.
80 hrs.	7.5 hrs.
182.5	HOURS
	METHODS 150 hrs. 80 hrs.

Part: STEAM TURBINE BUCKETS	CONVENTIONAL METHODS	EX-CELL-O NUMERA-TROL
Lead time	144 hrs.	24 hrs.
Machining per/piece	90 hrs.	12 hrs.
TIME SAVED	198 H	IOURS

Are you faced with tough prototypes or production

parts that "can't" be produced economically?

See your Ex-Cell-O Representative, or write direct for details on how you can apply Ex-Cell-O's Numera-Trol system of tape-controlled precision machine tools to do more jobs, faster and more

STYLE 922 PRECISION CONTOURING MACHINE

Slides are controllable to .000025". Grinding unit is interchangeable with boring and turning unit.



PRECISION CAM-MILLING MACHINE

Slashes lead time in producing drum-type cams.

PRECISION PROFILING MACHINE

Performs intricate and accurate milling and grinding of 3-dimensional forms.



FREE—"A Guidebook to Numerically Controlled Machine Tools." Send for your copy today.

NUMERA-TROL

SEE EX-CELL-O'S BOOTH 946, NMTBA EXPOSITION

EX-CELL-O FOR PRECISION

accurately!

MANUFACTURERS OF PRECISION MACHINE TOOLS + GRINDING AND BORING SPINDLES - CUTTING TOOLS - ORILL JIG BUSHINGS - TORQUE ACTUATORS - CONTOUR PROJECTORS - GAGES AND GAGING EQUIPMENT - GRANITE SURFACE PLATES - AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS - ATOMIC ENERGY EQUIPMENT - RAILPOAD PINS AND BUSHINGS - DAIRY AND OTHER PACKAGING EQUIPMENT

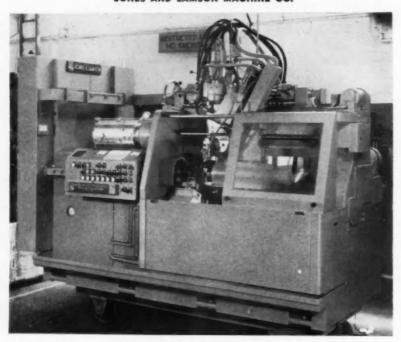
Machinery Division

TTING TODG

GING COUP(S - ATOMIC CORPORATION)

EDUIPMENT CORPORATION

JONES AND LAMSON MACHINE CO.



J&L 60 deg model 30 automatic tracing lathe for high production operations

Circle 64 on postcard for more data

AUTOMATIC TRACING LATHE—J&L's Booth at the NMTBA Exposition will include turret lathes ranging from a standard, manually-operated No. 3 ram type turret lathe up through an entirely new line of machines with automatic transmissions; an all-new, completely automatic, electro-mechanical machine, and a new production model of the Jones & Lamson numerically controlled turret lathe. Machines will be in operation on actual production jobs.

Among other production proven turret lathe operations, you will see multiple tooling on a two-dimension turret lathe tracing unit, and the auto-threader, which provides completely automatic cycling for singlepoint thread chasing.

Moving on to other high production machines, Jones & Lamson will have in operation three different variations of the all new family of Model 30 single spindle automatic turning and tracing lathes. The basic machine is a bridge-bed design for rigidity, extreme versatility of tool motion, ease of loading and unloading, manual or automatic. Booth

E. W. BLISS CO.

INCLINABLE PRESSES — "New Ideas in Pressed Metal Production" is the theme of the E. W. Bliss exhibit. Focal point will be four different models of their new big "C" series presses, representing a modern concept in the design and construction of inclinable presses. Also on display will be a variety of other equipment, representing not only advances in the field of pressed metal, but also growing diversification in the area of automatic production. Four tonnages—22, 35, 45 and 60—

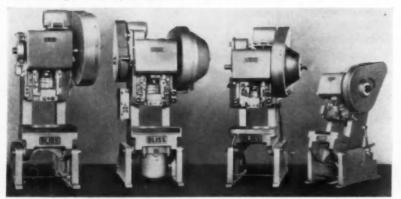
will be displayed, including both geared and non-geared types. Most important among the presses' new features is their modern cast Meehanite frames which reduce deflection at full tonnage, increased dimensions in bed and die areas, and heavier design of all load-bearing working parts. Another unusual development is a portable inclining device that can be used with a whole battery of presses, eliminating the cost of separate units for each press. Booth 1325.

cise processing of an anti-friction bearing inner ring's functional surfaces can be accomplished in two steps on two automated Microhoning machines. After the ID is Microhoned straight and round on a model 738-C (using diamond abrasives), the raceway is finished concentric with the bore on a model 2HRI-5, illustrated. Booth 1225.

MICROMATIC HONE CORP.

MICROHONING MACHINE-Pre-

Circle 66 on postcard for more data



These are the big C series inclinable presses to be exhibited at the NMTBAE

Circle 65 on postcard for more data

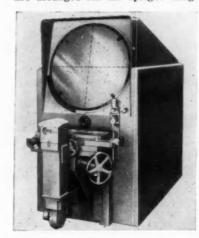
LELAND-GIFFORD CO.

DRILLING UNITS—Two new tape controlled drilling machines, two new gun drilling units, two new standard multiple spindle drilling machines and a new high precision drill grinding machine will be shown for the first time at the Machine Tool Show. Also on display will be a comprehensive display of the Leland-Gifford line including multiple spindle drilling machines, self-contained drilling units, "Hole Locators," lathe tracer attachment and drill jig bushings. All of the machines on display will be set up and operating. BOOTH 631

Circle 67 on postcard for more data

COVEL MFG. CO.

OPTICAL COMPARATOR — The stage uses micrometers of one inch travel for measuring both the horizontal and vertical planes with provision for measuring rods or gauge blocks for the balance of the stage travel. The optical system uses relay lenses so the projection lenses are inside the cabinet, therefore do not project out over the table allowing maximum staging room. The optics are arranged for an upright image



for all magnifications. The screen ring is graduated and has a two minute vernier. As this ring is rotated through a reduction gear setup by a small knob, very fine increments in angular adjustment can be obtained. Stage table has built-in angular adjustment 15 deg each way with vernier.

The turret is operated from the front of the machine and any one of the magnifications listed above is easily selected. Booth 332.

Circle 68 on postcard for more data

BARDONS AND OLIVER, INC.

CUTTING-OFF LATHE — Designed to form, chamfer, groove and cut off pipe, tubing or bar stock, the number 33 to be shown at the Exposition will feature several new attachments that increase the scope of work that can be handled. The positive stop, slide attachment with time delay allows forming to very close tolerances.

The new direct acting remote control unit on the stock stop allows cutoff of unlimited lengths. The improved OD chamfer attachment offers increased capacity and simplified controls. Carbide, roller cutter, and high speed steel tooling will be shown. Booth 741.

Circle 78 on postcard for more data

POPE MACHINERY CORP.



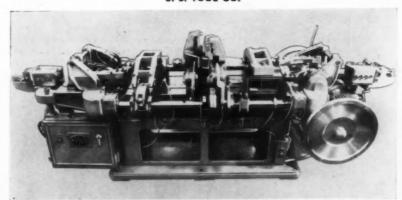
High precision is featured on a new boring machine with a precision programmer.

Circle 69 on postcard for more data

PRECISION BORING MACHINE—Pope Machinery is presenting a new machine tool that bores holes simultaneously from both directions—holes that are round within twenty millionths. Fast production is attained by the two moving heads plus the ability to effect fast setups with a new electric programmer, illustrated. This consists of a unified control center that may be located where convenient for the operator and that provides fully automatic cycling and

great flexibility of operation as well as faster setup. The precision programmer makes it easy for the operator to employ a synchronized start for the two heads after which they run independently, a completely independent cycle for each head, or movement of one head triggered at any predetermined point of the other head's cycle. It also controls rapid traverse, fine feed rate, dwell time, and rapid traverse reverse. Booth 482.

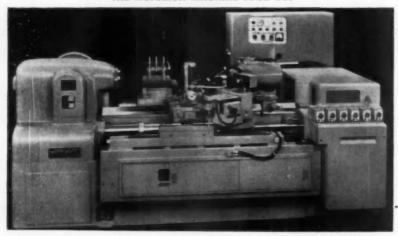
U. S. TOOL CO.



STAMPING MACHINE—Two new additions to a line of multi-slide machines were designed for the production of precision formed stampings. Illustrated here is the model MS-36D. This unit is, in effect, a double ended machine into which stock can be fed from coils. This stock is fed into each end to the center. Fabrication of assemblies made and assembled in the machine, can be arranged with this unit. It can also be used to make two different type stampings. Booth 842.

Circle 71 on postcard for more data

THE MONARCH MACHINE TOOL CO.



Model 21-H Mona-Matic, a high speed automatic cycle lathe which features a four-cut cycle and hydraulically powered front carriage and rear slide.

Circle 72 on postcard for more data

LATHE—Designed as a production lathe, the Mona-Matic, is particularly adapted to the machining of work pieces requiring heavy stock removal. When furnished with a four-cut cycle, there is no reasonable limitation on the amount of stock removal. However, the machine may be supplied for two-cut or one-cut cycle work only if that is the requirement. The air-gage tracer system, which operates on the precision air-gaging principle, controls the hydraulically powered tool slide from a master

template. Stylus pressure against the template is 5 to 6 oz. Accuracy of template shape is reproduced within ±0.001 in., according to the manufacturer. Front carriage feed and traverse are accomplished hydraulically by a cylinder mounted in the apron. Feed rates are variable from 1 to 40 ipm, and carriage traverse is 200 ipm. Facing and forming slide feed rate is ½ to 20 ipm while the traverse is at 90 ipm; both hydraulically actuated. Booth 701.

TAFT-PEIRCE MFG. CO.

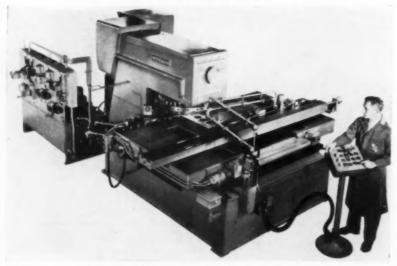
PRECISION MACHINES — Two "Microstoning" machine tools, first of their kind built in this country according to the manufacturer's report, will highlight the Taft-Peirce exhibit at the National Machine Tool Builders Exposition. The machines are designed to give the finest, most accurate finish and roundness correction possible on a production line basis. The machines incorporate the principles of the widely-acclaimed Supfina "Microstoning" attachments introduced by Taft-Peirce last year.

One is a plunge cut machine with automatic cycling, on which outside work surfaces up to 2 inches long by ½ to 1½ in. dia. can be finished to a low microinch reading. The other is a "Throughfeed" model which passes pieces to be surfaced under a series of abrading stones to correct out-of-roundness and to reduce rough surfaces to precision smoothness, automatically.

Also, there will be two number one precision surface grinders in the exhibit. One will be set up to demonstrate precise form grinding. It will be equipped with a Diaform wheel dresser and a variable speed control for the wheel spindle. A six-inch rotary grinder and manual lapping machine as well as a back spot facer will also be demonstrated. BOOTH 1426

Circle 73 on postcard for more data

WIEDEMANN MACHINE CO.



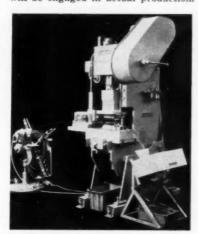
Numerical positioning control is featured on large unit

TURRET PUNCH PRESS-Flexible fabrication of sheet metal and plate using tape control or templates for hole positioning will be featured by Wiedemann in their booth. A total of seven machines will be in operation. Highlight of the exhibit will be a new 15 ton capacity turret punch press with numerical positioning control. Holes will be automatically located and pierced at the rate of 60 per minute-including tool changing. Actual jobs will be produced demonstrating the speed and flexibility of the unit. The press operates at 200 crankshaft strokes per minute and the table moves at the rate of 500 in. per minute. Turrets carry from 26 to 32 different punches and dies, each accurately aligned. Any set is rotated into piercing position as required upon command by the tape. Booth 1249.

Circle 74 on postcard for more data

NIAGARA MACHINE AND TOOL WORKS

PRESS—A huge exhibit of presses, press brakes, and shears is planned for this year's Machine Tool Exposition and will utilize 80 per cent more space than in 1955. Of the 12 machines in Niagara's display, several will be engaged in actual production.



Sharing the spotlight will be an ultra-high speed, fully automatic OBI press operating at variable speeds up to 1000 strokes per minute to produce parts at a million-per-day rate, according to the company report. Booth 1330.

Circle 75 on postcard for more data

CINCINNATI LATHE AND TOOL CO.

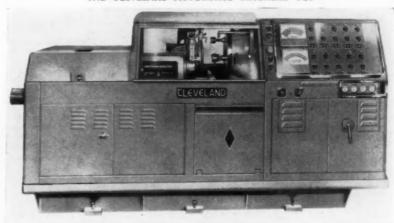
NUMERICALLY CONTROLLED LATHE—The latest applications of numerical control to turning and drilling will highlight the Cincinnati booth. Four completely new tape controlled machines will be in constant operation, demonstrating practical automation. The new Cintimatic numerically controlled lathe will turn a wide selection of stepped shafts—fully automatically.

To demonstrate the ability of this lathe to produce even the shortest runs more economically than by conventional operation, no two identical parts will be run in succession. Cincinnati's wide range of numerically controlled drilling machines will be represented by three models.

Fully automatic drilling and tapping with extremely rapid set up will be shown on the new Cintimatic turret drill. Accuracy and versatility of the numerical control console and positioning table applied to a single spindle 25 in. Cincinnati drill will be demonstrated. BOOTH 934

Circle 76 on postcard for more data

THE CLEVELAND AUTOMATIC MACHINE CO.



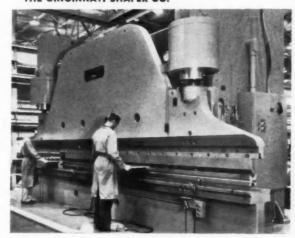
SINGLE SPINDLE AUTOMATICS—Four single spindle automatic machines will be shown in operation. Each of these machines will be tooled for production jobs, and features a new line of tooling. Also featured with these units will be an automatic parts loader, a pick-off attachment, high pressure oil feed for deep hole drilling and a LeBlond Regal tracer attachment. Booth 900.

Circle 77 on postcard for more data

THE CINCINNATI SHAPER CO.

PRESS BRAKE — This unit, known as the 750 H by 16, is the longest press broke Cincinnati has ever exhibited at a Machine Tool Exposition. This 750 ton Hydraulic Press Brake has a bending capacity of 3/4 in. by 14 ft mild steel over a 7 in. die opening. The overall die surface is 24 ft and the throat depth is 18 in. All machines in this booth will operate as near to actual conditions as possible. Booth 1230.

Circle 78 on postcard for more data



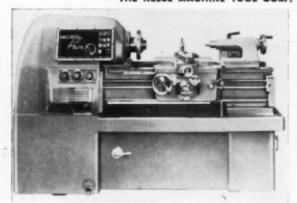
THE LODGE AND SHIPLEY CO.



LATHE—This latest addition to the Lodge & Shipley lathe line is specifically designed for the demands of present and future tooling (ceramics, etc.) with extra ruggedness, high horsepower and other teatures. The demonstration operation will show rough turning of a large, stepped roller shaft with heavy cuts and effective use of ceramic tools. Booth 1046.

Circle 79 on postcard for more data

THE NEBEL MACHINE TOOL CORP.

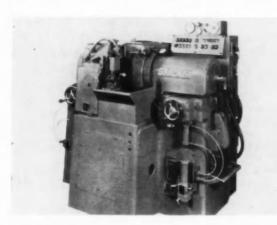


PRECISION LATHES—The infinite speed selection of the MT 1308 and MT 1510 Micro-Turn lathes is controlled by increase and decrease pushbuttons, with indication on a directHighlighted at this display will be the new Nebel Micro - Turn Lathes which offer infinitely variable spindle speeds from 43 to 3500 RPM, with exclusive new coaxial headstock design for delivery of maximum horse-power and smoothness in roughing or finishing.

Circle 80 on postcard for more data

reading tachometer. The infinite speed range plus constant horsepower are provided by a mechanical speed variator driven by an AC motor equipped with hardened alloy steel

members to insure long life. The exclusive new coaxial headstock is designed around a single shaft surrounded by a floating type ring and planetary gear arrangement. Minimum vibration of the transmission is complemented by the mounting of the spindle on three pre-loaded precision bearings that do not require adjustment throughout their life. The headstock is basically composed of two sections. The compact back gear unit, which provides high reduction in minimum space, operates only on low speed range, presenting maximum power at the spindle for rated horsepower cut up to 400 RPM. For the high speed range above 400 RPM, the coaxial sections lock into a single unit. The Micro-Turn then operates without gearing or adjustable belts, directly from main drive to spindle. Booth 1319.



The new 2H10 precision double horizontal spindle disc grinder grinds parallel the two sides of instrument bearing races. The opposite flat faces of the workpieces are ground parallel to 0.00025 in. with uniformity of 0.00075 in. 50ck removal is 0.006 in. to 0.008 in. Work rate is over 5000 pieces per hour.

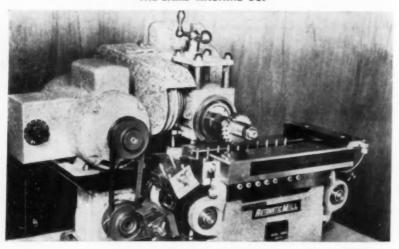
Circle 81 on postcard for more data

GARDNER MACHINE COMPANY

DOUBLE SPINDLE GRINDER — Small parts are ground at rates of 5000 to 6000 an hour to "millionths" tolerances by a new double-spindle grinder according to the manufacturer. To be introduced at the Machine Tool Exposition, the grinder is designed for automatic grinding of parallel sides of small parts at high rates and to the precision standards required by guidance control, instrument, and similar small-parts makers. A 5 hp motor drives each of its two 15 in. dia abrasive discs. Booth 811.

Circle 82 on postcard for more data

THE BAIRD MACHINE CO.



Machine features jaws which open and close automatically while in continuous operation.

MILLING MACHINE-A recently developed automatic milling machine for production milling rates as high as 6000 parts per hour will be exhibited in operation. Designated the AutomaticMILL, the machine is capable of maintaining tolerances of ±0.001 in. in the milling of precision electronic components as small as 0.050 in. by 1/4 in. as well as tool bits as large as 1 in. square. In operation the chain drive continuously moves as the parts to be milled are inserted by hand or automatically hopper fed into the jaw cavities. The jaws are attached to the carrying bases which are accurately located in the ways by heavy spring loaded bearings. Individual self contained jaws apply pressures from 50 lbs up to 1/2 ton per jaw firmly holding the workpiece. Booth 1142.

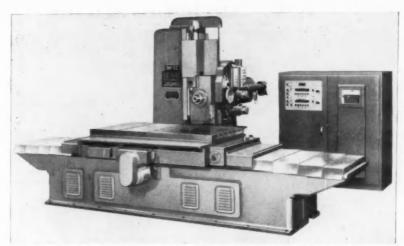
Circle 83 on postcard for more data

DEVLIEG MACHINE CO.

JIGMILS—New tools to be introduced are "H" series Jigmils with DeVlieg Diatrol direct dial dimensioning system and Tapac, DeVlieg's own system of numerical tape control. Also, to be shown in operation will be the Micropoint tool grinder. The new "H" series, available in spindle sizes ranging from 3 to 5 in., greatly increases Jigmil range for precision boring, milling, drilling and other operations.

Features incorporated into the new series include simplified controls and thermal control of main spindle bearings for increased accuracy. Another feature is wider bed and table for added stability and working range.

Diatrol, to be demonstrated on a Model 3M-48 Jigmil, is the DeVlieg system of direct dial dimensioning. This system of automatic point to point positioning makes it possible for the operator to control locations of the machine spindle and work table by dialing in the dimensions.



This is one of the "H" series Jigmils which will be seen at the exposition.

Tapac, to be shown in operation on a Model 3H-72, is the new De-Vlieg system of automatic tape control. Designed to make full use of the Jigmil's inherent accuracy and precision, this is a point to point system for automatic measuring, positioning and cycling complete parts programs utilizing 1 in. eight-channel standard punched tape input. Booth 431.

Circle 84 on postcard for more data

THE AMERICAN TOOL WORKS CO.

TAPE CONTROLLED LATHE—
This concept of a tape controlled lathe is one of simplicity and versatility. This is accomplished by the combination of an electronic duplicating system and a tape controlled discreet positioning system. It is able to do step shafts as well as contours, fillets, radii, tapers and other free forms.

Powered by a 50 hp constant hp 4 to 1 variable speed main drive motor, the 20 spindle speeds are in a range of 50 to 900 rpm and are tape selected. The longitudinal and cross feed screws are both anti-backlash ball screws. This lathe utilizes a flat template and the tracer system is a 360 deg or 2-dimensional General Electric.

There are 20 feeds with a range of ½ to 16 in. per minute and these are tape selected. There is an automatic indexing square tool turret with tape selected position and the front face of the turret will travel from a point 10 in. in front of center to a point 10 in. behind center. The numerical control is General Electric and utilizes the 8-channel punched tape. BOOTH 381.

Circle 86 on postcard for more data

AUTOMOTIVE INDUSTRIES
KEEPS YOU INFORMED

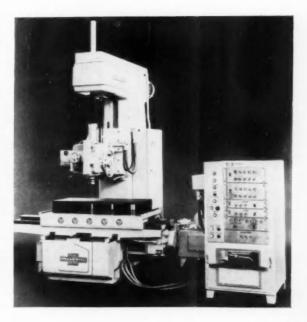
THE HEALD MACHINE CO.

GRINDING MACHINES—Six new machine tools, developed to meet industry's need for faster rates of metal removal balanced with optimum surface finish and tolerance control in precision grinding and boring operations, will be exhibited by Heald in Chicago. Machines shown

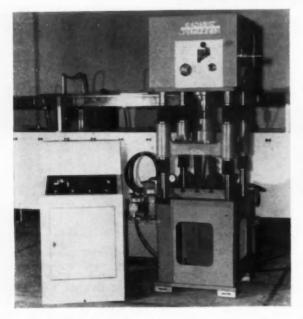
for the first time include a new numerically controlled "Healdrill," model 090 miniature internal grinder, 171A internal grinder, 322A Bore-Matic, model S Bore-matic with numerical control and model 4 tool sharpening machine. Booth 924.

Circle 85 on postcard for more data

Equipped with Cincinnati "Acramatic" tape control, this new comer to the Heald line of machine tools permits direct programming of all func-tions: Table positioning, speeds, feed rates, and tool changes. Features spindle depth control to predeterm-ine tool down-feed position and an automatic "Z" cycle which enables machine to operate unattended while drilling hole patterns which conform in diameter. Spindle speed range is 30-1800 rpm (in 16 increments); spindle feed range 0.002 in. to 0.030 in. per revolutiton (in eight increments). The Healddrill shown at the Chicago Exposition drilling a large aluminum gear cover plate used on the Healddrill itself.



DENISON ENGINEERING DIV., AMERICAN BRAKE SHOE CO.



An important feature of this new unit is that the number of ram strokes can be changed while the machine is cycling. Presures can also be changed while the machine is in operation. Through the servo-loop system, feed control is automatically sequenced to any changes in ram stroke.

Circle 87 on postcard for more data

HYDRAULIC PRESS — A high speed, hydraulic press for the stamping industry will be in operation at

the Exposition. The new 25-ton hydraulic press is capable of delivering over 600 ram strokes per minute.

Designed for high speed progressive stamping operations, this unit is a vertical frame, four-column design platen press, equipped with a number 3-6-1/2 Littell roll feed, stock oiler and variable speed straightener. Bed area between guide posts is 20 by 20 in. There are a variety of optional bed bolster plates available.

Daylight area is 13 in. which can be mechanically adjusted with a screw thread a total of 3 in. The press contains a closed circuit hydraulic system, servo drive, with harmonic cam drives for work strokes of ½, ½, ¾, 1, 1½, 2 and 3 in. Cams can be varied to permit special work strokes. Punch break through is adjustable and controlled without positive stops.

Range of punch break through adjustment is 1 in., in increments of 0.001 in. Elimination of positive stops also means reduced noise levels while the machine is in operation. Inching and set-up controls for the ram and feed can be operated either simultaneously or separately. Booth 914.

W. B. KNIGHT MACHINERY CO.



JIG BORER—The new model 65 numerically controlled jig borer will be shown for the first time at the 1960 Exposition. It features accuracy to "Tenths" and a high traversing speed. The table and saddle traverse simultaneously. The Sperry control system used on this unit reads the tape by low pressure air. An entire block of tape containing all necessary information for a given position is read simultaneously. Booth 824

Circle 88 on postcard for more data

NORTON CO.

HOBBING MACHINE — This machine, brand new at this Exposition, is designed specifically for high production of single and double thread worm gears up to 3 in. circular pitch. Gears made on this machine are widely used as worm gears in automotive rear axles, electric elevator drives, speed reducers, hoisting and mining machinery and in machine tools.

Both hobs and carbide tipped fly tools can be used on this machine. Fly tools can also be used economically in high production work.

Twenty TWG hobbers are available with automatic cycle, infeed, tangential, or combination infeed and tangential at preselected variable speeds. Infeed hobbing is faster for single thread worm gears. Tangential hobbing, either right or left hand, is used for the highest quality multiple thread worm gears. The infeed-tangential feed combination is well suited for the use of tapered hobs in producing multiple-thread worm gears. BOOTH 651

Circle 89 on postcard for more data

AUTOMOTIVE INDUSTRIES
KEEPS YOU INFORMED

GALMEYER AND LIVINGSTON CO.

SURFACE GRINDER-This number 206 Grand Rapids hydraulic feed surface grinder will give micro-inch finishes at production speeds, according to the manufacturer. The onepiece column and base casting assures permanence of alignment between cross travel ways and upright head ways. This machine incorporates table speeds up to 110 fpm. The working surface of the table is 6 by 18 in. The standard wheel size employed with this unit measures 8 by ½ by 1¼ in., and the vertical movement of the wheel head is 14 in. Booth 751.

Circle 90 on postcard for more data

THE SHEFFIELD CORP.

THREE COLUMN GAGE — This three-column Precisionaire gage simultaneously measures the external diameter of a male part on one col-



umn, the internal diameter of a female part on the second column, and at the same time indicates the amount of diametral clearance between the two parts on the third column. Booth 201.

Circle 91 on postcard for more data

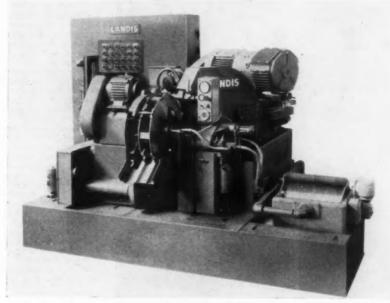
LEES-BRADNER CO.

GEAR HOBBING—With the slogan "Improving Gears for 50 Years", Lees-Bradner celebrates its Golden Anniversary in the design and production of gear hobbing machinery.

At the Exposition the company will unveil its most recent contribution to the art of gear hobbing . . . two gear hobbing machines. One is a new heavy duty machine, model 12HD 12 by 20 in. single spindle vertical production hobbing machine, designed to hob larger and heavier gears up to 12 in. in dia. This machine will be operating at production feeds and speeds with a precision formerly possible only in cutting smaller gears. BOOTH 481

Circle 92 on postcard for more data

LANDIS TOOL COMPANY



This machine was designed for production grinding operations which require close tolerances.

Circle 93 on postcard for more data

PLUNGE GRINDER — Production grinding of multiple diameters of a front axle spindle in combination with faces and radii is automatically performed on the new Landis R Plunge Cylindrical grinder, which will be shown in operation at the Exposition. A single purpose machine, the R plunge grinder is de-

signed for production grinding to

very close tolerances with automatic

or semi-automatic cycles and angular

or straight wheelhead. Tooling can be designed to handle a broad range of parts that must be production ground on a center type machine in the 15 hp class. Three major features of the grinder are a new headstock spindle, a new hydraulically operated footstock, and a pre-loaded ball slide dresser. The new headstock spindle is automatically adjusted laterally for positioning the work in relation to the wheel. Booth 823-825.

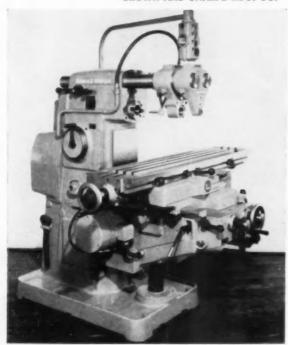
GIDDINGS AND LEWIS MACHINE TOOL CO.

RADIAL DRILLS—Two Bickford "Chipmaster" radial drills will be among the 15 machine Tool Exposition by Giddings & Lewis. The 15 in. column radial will be demonstrated under power, drilling holes and tapping Class 3 threads. A 19 in. heavy-duty radial drill, with full preselection of speeds and teeds, will be displayed drilling 3 in. dia holes at 0.100 in. feed per revolution in steel. This 19 in. drill is available with 6, 7, or 8 ft arm lengths. Booth

Circle \$4 on postcard for more data



BROWN AND SHARPE MFG. CO.



MILLING MACHINE -Greater precision and increased productivity will be keynoted at the Brown & Sharpe exhibit of 23 machine tools. Over half of the machines and attachments are completely new in design and will have been announced since January 1960. Others are new or improved models; introduced during the past few years. Very prominent among the new machines will be complete new line of No. 2 milling machines, including plain, universal and vertical units of 3, 5 and 10 horsepower capacity. Also included will be the newly designed Rangemasters, sliding head type, milling ma-chines. Booth 452.

Circle 94 on postcard for more data

BUFFALO FORGE CO.

BILLET SHEAR — A new Billet Shear, offering many advanced features, will be shown in action in the Buffalo Booth at the Machine Tool Exposition. Designed to provide continuous service in production cutting, the new 400 Shear will function continuously at full capacity (within its rating) on any shearable material.

Ram tonnage of the new shear is 400 tons, and operates at speeds up to 60 strokes per minute (free running). It is able to handle billets up to 4 in. sq., rounds up to 4½ in. dia and flat bars up to 12 by 2 in. The maximum round or square size handled without machine modification is 5 in. square or round.

The machine stroke is 2 in. The mass and weight of the new frame are approximately doubled over previous designs to assure continuous high speed cutting. Friction type clutch gives protection against overload. A minimum clearance of 1 in. is allowed above the incoming workpiece for freedom in feeding. Booth 551.

Circle 97 on postcard for more data

L & J PRESS CORP.

GAP FRAME PRESS — Designed specifically for handling large dies and wide stock, this press will be exhibited with 8-station transfer and roll feeds to illustrate its adaptabil-

ity to tooling requirements. It is of the double crank type and is equipped with an air clutch. The frame and box slide are of heavy, welded construction. Booth 1116.

Circle 95 on postcard for more data

AUTOMOTIVE INDUSTRIES

Keeps You Informed

PORTAGE MACHINE CO.

MILLING MACHINE — The new Portage horizontal milling, drilling and boring machine, which will be displayed, is available with 3% in. spindle. Tape console and position measuring unit is a Warner and Swasey Tele-Probomat system.

Tape is standard 1 in. eight channel paper or mylar with binary code numerical data prepared with Freiden Flexowriter or with Warner and Swasey key punch. The tape reader can be used with key punch to duplicate tapes if desired.

Read-out units on each axis position to 0.001 in. with repeatability to 0.005 in. Standard tape system is three axis for control of head, table and saddle movements. Control and drive is applied to each axis in sequence only for accuracy and for simplification of part work planning. Numerical positioning input information can be dial input or tape input. Zero-set is included for initial part positioning and recheck can be made at any time. BOOTH 338

Circle 98 on postcard for more data

EX-CELL-O CORP.



VERTICAL BORING MACHINE — A new vertical precision bor-ing machine, the model 411, designed for pre-cision turning, boring, facing, grooving and chamfering operations on medium-size parts will be on display at the Ex-Cell-O booth. This new machine is of single column construction and has a counter-balanced, hydraulical-ly operated compound slide mounted on the column. Using basic components, seven different arrangements of the model 411 are pos-sible. Spindle drive motors may be mounted on either left or right, single and dou-ble spindle combinations may be employed and two or more ma-chines combined for multiple operation. Booth 946.

Circle 96 on postcard for more data

THE LAPOINTE MACHINE TOOL CO.

BROACHING MACHINE—This machine is complete with automatic puller, work nest for holding one part, and automatic coolant equipment. Designed with the Saginaw steering ball screw, it operates at



broaching speeds 5 to 10 fpm. Part being broached: Starting with a partly machined hole of 0.750 in. the machine will broach a square, hex, involute, serration, six-spline or onespline form in the hole. Booth 1229.

Circle 60 on postcard for more data

THE HAMILTON TOOL CO.

GEAR HOBBER — Precision gear hobbing operations will be performed by Hamilton at the Exposition on their number 1-B gear hobber shown here. All the machines to be exhibited will be in operation. This



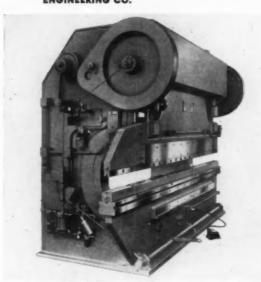
display will include drilling machines, tapping machines and the number 00 gear hobber. These units are all designed for precision machining operations. Booth 486.

Circle 62 on postcard for more data

THE STEELWELD MACHINERY DIV., THE CLEVELAND CRANE AND ENGINEERING CO.

PRESS BRAKE — This 160 tan mechanical press brake will be displayed along with three other large metal-cutting and metal-forming machines. This unit, known as the model H3 1/2-10, incorporates an air operated clutch and brake, an 18 in. throat, and a near-bottom strake stop feature. These press brakes are available for bending various lengths of mild steel plate to 30 in. and for all thicknesses from 10 gauge to 2 in. The capacity of the line ranges to 2000 tons.

Circle 61 on postcard for more data



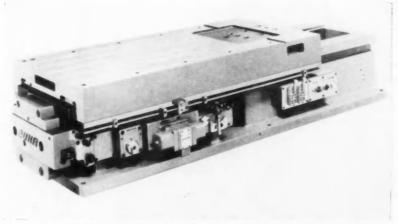
BUHR MACHINE TOOL CO.

WAY TYPE FEED UNITS-Industry's first public demonstration of equipment built to the new Special Machine Tool Standards is planned by Buhr for the Machine Tool Exposition. Basic equipment to be shown in operation includes 2-way and 3-way multiple operation machine tools built to the new standards which govern such factors as the mounting and attaching surfaces of main bases, wing bases, feed units, horizontal angular adapters, angular columns and the bolting patterns of these units as well as work loading height. The machines to be displayed

are designed for maching tractor transmission housings weighing approximately 150 pounds each.

Panel mounted controls, another Buhr development which increases the versatility and adaptability of the way type feed units, include plug-in limit switches, a 5-position color coded shifter for the valve spool and a piggyback solenoid pilot pressure valve which operates the main spool for rapid advance and return. Additional mechanically operated spool positions, control 1st feed, 2nd feed and stop. Booth 1440.

Circle 63 on postcard for more data



Way type feed units feature controls mounted on the unit for easy conversion

FRAUENTHAL DIV., KAYDON ENGINEERING CORP.



GRINDER—Frauenthal reports that precision to ±100 millionths of on inch is featured on their new 1200 series single - spindle vertical tracer or numerically controlled grinder. The new tracer system has an all - transistorized electronic control for compactness. A con-tinuous recorder shows deflection, indicating immediately any variation from true contour path between template and work slide and gives a permanent recontouring accuracy. The series is available in two models, with table diameters from 24 to 42 in., and nominal swings of 36 or 48 in. Booth 1220.

Circle 99 on postcard for more data

COLONIAL BROACH & MACHINE CO.

BROACHING MACHINE—A more conventional "Utility" type pulldown broaching machine, called the RD-5-30, will also be on exhibit as well as a model FS-5-36 broach-grinder for sharpening flat type broaches. In addition to broaching equipment, Colonial will exhibit its latest tracercontrol operated Hydro-Cycle contour mill. This milling machine is ideally

suited to die work and for aircraft parts. A universal indexing table providing positive indexing with complete freedom from backlash at all times will be another feature shown. The table is designed not only for broaching but also for milling, boring, drilling and other types of operations requiring high index precision. Booth 241.

Circle 100 on postcard for more data

THE BRYANT CHUCKING GRINDER CO.



CAM GRINDER-This booth will feature a vertical cam grinder in action grinding pump ring bores. This vertically constructed ma-chine is designed for production grinding operations and is reported to improve procontoured through through the operation of the eccentric workholding fixture in a horizontal plane. Also featured will be a new general purpose ma-chine, which will be shown for the first for the first time. It was designed for ID, OD, internal face and rotary face grinding. Booth 936.

Circle 356 on postcard for more data

EX-CELL-O CORP.

BORING MACHINES — Two new double-end and two new single-end standard precision boring machines, models 731, 732, 751 and 752, will be among the precision machine tools which Ex-Cell-O will have on display at the NMTBA Exposition.

Featuring temperature controlled hydraulic panels, redesigned bases for greater stability and rigidity, more rigid machine tables with more ribbing for greater strength, and relocated and redesigned table stops for more accurate repeatability; the new line of horizontal hydraulically operated, precision boring machines is intended to provide maximum dimensional stability under all kinds of operating conditions.

Capable of performing such operations as precision boring, turning, facing, counterboring, chamfering, grooving, recessing and trepanning, the new machines also feature extreme versatility.

They may be operated either manually or automatically, and are easily adaptable to point-to-point numerical control or incorporation into an automated production line.

Called the Ex-Cell-O Model 922 Numera-Trol, this two or three dimensional tape controlled machine boasts an extremely heavy, highly rigid bed, hand scraped anti-friction ways, lead screws with recirculating ball-type anti-friction screw and nut assemblies and preloaded ball thrust bearing supports on each end.

This Model 922 Numera-Trol machine is designed to operate from any high performance numerical control system. Quantizers geared to the servo motors provide closed loop feedback sensitive to incremental pulse values of 25 millionths of an inch.

Ex-Cell-O's Model 712 Precision Boring Machine features the provision of interchangeable multiple spindle plates which may be quickly and easily detached and exchanged.

This unique feature permits full utilization of the machine for job lot production, as spindle plates containing from one to ten individual spindles can be used.

The machine is of double-end construction with spindle plates on both ends, boasts a fully automatic cycle, and close tolerances on hole diameters and center distances are easily attainable. Booth 946.

Circle 357 on postcard for more data

Turn to page 170, please

AUTOMOTIVE INDUSTRIES

ONE WAY

MACHINE TOOL AND PRODUCTION EQUIPMENT ISSUE 1960

PRODUCTION ENGINEERING SHOW SECTION



MAKING PRODUCTION PAY

The Production Engineering Show's \$10 million exhibit of manufacturing equipment and components is housed in Chicago's Navy Pier

PRODUCTION ENGINEERING SHOW

Navy Pier, Chicago --- September 6-16

By Charles A. Weinert

HELD every five years to coincide with the Machine Tool Exposition, the Production Engineering Show opening next week will have about 35 per cent more exhibitors and occupy upwards of 50 per cent more exhibit space than it did in 1955.

Theme of the Show is "Automation, Key to Manufacturing in the 1960's." In the \$10 million display by 270 exhibitors will be equipment which complements new machine tools or which individually contributes to increased efficiency of industrial production and processing.

The Production Engineering Show is being held in both sections of Chicago's Navy Pier on the same days the Machine Tool Exposition is in process at the International Amphitheatre. Physical separation of the two exhibitions was necessary because no exposition hall in the country could simultaneously house the two.

Hours of the exhibitions have been dovetailed for the convenience of visitors. The Machine Tool Exposition-1960 will be open from 10:00 AM to 5:30 PM, while the Production Engineering Show will be open from 1:00 to 10:00 PM, daily. Both will run for 10 days, beginning Tuesday, September 6 and continuing through Friday, September 16 (Sunday, September 11 excepted).

One \$3.00 registration fee and the same badge (obtained at either place) will admit a visitor to both shows. Also, the same Inquiry Timesaver Plate—to save a visitor's time in requesting further information from exhibitors—will be usable at both events.

Buses marked "Production Engineering Show" will run from Loop hotels to the Navy Pier, as well as back and forth between the two exhibition halls. The Navy Pier is located at Grand Ave. and Lake Michigan.

Some of the controls and equipment exhibited at the Production Engineering Show will be installed on machines displayed at the Machine Tool Exposition. Visitors will thus be able to inspect this equipment at Navy Pier and then see how it operates when applied to machine tools on display at the International Amphitheatre.

The equipment at the Production Engineering Show, in many cases, will be demonstrated under simulated factory conditions. Among the varied products being shown in the exhibits are:

Control Equipment: Numerical controls; metering and monitoring devices; quick-disconnect shutoff and pressure-relief devices; and signaling and recording equipment.

Machine Components: Indexing and sequencing devices; lifting and positioning devices; motors; bearings, pulleys, clutches, gears and V-belts; pumps; compressors; switches, relays and other electrical devices.

Auxiliary Equipment and Supplies: Coolants; lubricants; hydraulic fluids; portable tools; chucks; jigs and dies; and registration devices for controlling moving sheet materials with photo-electric, pneumatic and mechanical controls.

Production Equipment: Welding machines; riveting machines; grinding and polishing equipment; heat treating equipment, including furnaces, induction heaters, and explosive - hardening equipment; parts - cleaning equipment, including mechanical, ultrasonic and abrasive blasting; waste-disposal equipment, including conveyors, scrap balers, and fumeremoval hoods; electro - plating, electro - polishing, and chemical milling equipment.

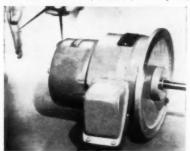
PRODUCTION ENGINEERING SHOW

FOR ADDITIONAL INFORMATION please use reply card at back of issue

By C. J. Kelly

GENERAL ELECTRIC CO.

BRAKE MOTOR—A new brake motor which is up to six inches shorter and as much as 20 pounds lighter than standard brake motor designs of equivalent ratings is scheduled for introduction at the Production Engineering Show. This motor is designed for use on hoists, cranes, conveyors,



and machine tools. Frame and endshields of the new brake motor are of cast iron constructions. Known as the Thinline, this brake motor is available in polyphase ratings of one through five hp at 1800 rpm, three-quarters through three hp at 1200 rpm, and one-half through two hp at 900 rpm. Booth 110.

Circle 310 on postcard for more data

ROSS OPERATING VALVE CO.

MANIFOLD—Seven-station manifold mounting is one version of the Ross Pacer solenoid air valve. Manifolding a group of air valves at one station simplifies installation, operation and maintenance. Only one air inlet, one



electrical source and one exhaust are required. The Pacer is compact, with diecast aluminum body, has high capacity and is designed to JIC specifications. Features include: cycling in excess of 1000 cpm.; full 5/32 in. minimal internal orifice (n.c. side),—requires 7 watts of power; short poppet travel; dust- and liquid-tight seal; integral wiring space; accommodates ½ and ½ in. pipe sizes. It can be manually actuated and is inoperative if the captive cover is removed. Booth 220.

Circle 311 on postcard for more data

LASALLE STEEL CO.

NEW STEEL—To be introduced for the first time at the Production Engineering Show, a new steel has been designated "e.t.d. 150." It is 150,000 psi tensile minimum with a hardness of Rc 32-36. Recommended for applications in manufacturing shafts, gears, pinions, axles and other such items, this steel is available in rounds 7/16 through 3½ in. Tolerances range from 0.005 in the smaller sizes to 0.008 in the larger. Other types of steel will be shown also. Booth 147.

Circle 312 on postcard for more data

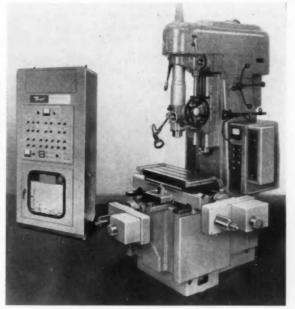
THE BENDIX CORP.

POSITIONING SYSTEM—The Bendix Corporation's Industrial Controls Section, will introduce its first numerical positioning system at the Production Engineering Show in Chicago. The new machine control unit, designated DynaPoint-20, will be demonstrated on a Moore jig borer. Flexibility of operation is provided by separate dial input switches which will allow manual positioning of the workpiece to the nearest ten-thousandth of an inch. Set-up is simplified

by the zero offset feature. This permits the initial reference point to be located on the work rather than on the table. Other Bendix control equipment to be displayed will include a Pratt & Whitney Numeric-Keller with DynaPath-23 contouring control, a Burgmaster turret drill with Ferranti FP-22 positioning control and a Ferranti FI-22 coordinate inspection machine. Bendix is the exclusive U. S. distributor of the Ferranti equipment. Booth 530.

DynaPoint-20 is a high performance control, operating on a closed loop servo system and capable of a electronic resolution of 0.00001 in. With this resolution, the unit can position the jig borer table to tolerances of less than 0.0001 in. within the range of table travel. Motion is simultaneous in both axes.

Circle 313 on postcard for more data



PRODUCTION ENGINEERING SHOW

STANDARD PRESSED STEEL CO.

THREAD FORM-A visual demonstration of the advantages of a new socket screw thread form will be in operation in the Standard booth at the Production Engineering Show. The improved thread form, the SPS Hi Life, boosts tension screw fatigue life as much as 100 per cent, according to the company report. Now standard on the Unbrako line of socket head cap screws, the Hi Life threads will be demonstrated by a Polariscope. The SPS exhibit will also feature an operating automated set screw driver which inserts up to 2500 set screws per hour; one-piece self-locking Unbrako socket screws with Nylok for reliable holding under shock and vibration conditions, and two new miniature size Hallowell shaft collars. SPS will use a Polariscope to project images of the stress patterns in the thread forms under load. Polarized light passed through a special plastic model of the screw thread form under load is broken up into alternating bands of light and dark. The degree of stress concentration is indicated by the relative bunching of the lines about the points of discontinuity. Booth 232.

Circle 314 on postcard for more data

IMPERIAL BRASS. MFG. CO.

POLYAMIDE POLYESTER HOSE
—New hose for hydraulic and other
high pressure applications will be one
of the products featured at the Production Engineering Show. The new



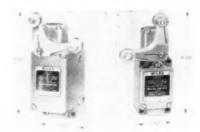
hose, which has a special polyamide inner tube with a high tensile polyester braid reinforcement, and an abrasion resistant polyamide cover, is reported to withstand burst pressures comparable to SAE 100-R1 wire braid hose. It is said to provide superior flex-impulse strength and resistance to abrasion and to offer smaller OD for equivalent pressure

and ID size. Other advantages listed are: non-aging, long-lengths available, not affected by non-flammable hydraulic fluids to 200 deg F. and by flammable fluids to 225 deg F. The hose is available with reusable and permanently attached couplings. Booth 450.

Circle 315 on postcard for more data

MICRO-SWITCH

LIMIT SWITCHES-Switches to be displayed at the show operate on the principle that when moved from either extreme position toward the other, the actuator causes the internal switching unit to transfer and maintain circuit. This new type of switch is especially valuable when a reciprocating member must operate the switch when moving in one direction and reverse it when moving in the other direction. Actuator heads of these switches may be mounted in four positions, 90 deg apart. The yoke actuator may be rotated 360 deg, positively locking in any posi-



tion. Actuator plungers and head assemblies are sealed against entry of foreign material by "O"-ring seals. Switch enclosures are tightly sealed by neoprene rings when closed. Use of sealed conduit when wiring the switches completes the seal. Booth 217.

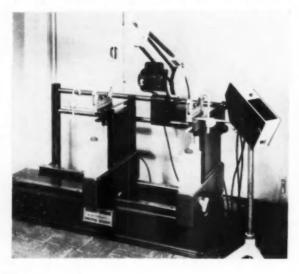
Circle 317 on postcard for more data

STEWART-WARNER CORP.

ELECTRONIC BALANCER — This new balancer replaces the model 702 balancer in the Stewart-Warner line, and incorporates several features not available in the former model. Most significant design feature is the convenient tripod-mounted head containing the strobe light, the meter and the electronic unit. Also available

with the new model is a conversion "package" with which the purchases can have all the advantages of a portable balancer at an additional moderate cost. This package consists of a vibration pick-up, in choice of two rpm ranges, and an adaptor. Booth 465.

Circle 316 on postcard for more data



Used in conjunction with the strobe light, electronic unit and meter head of the model 703, this portable balancer can then be utilized on all jobs involving in-place balancing — such as balancing of fans, maken it is necessary to determine inbalance in rotative parts without disassembling the vehicle, machine or equipment involved.

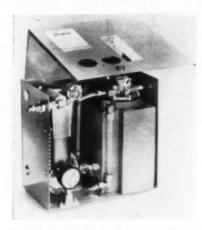
BROWNING MANUFACTURING CO.

BALL BEARINGS—New ball bearing units are available in the relube style. Compact design and lighter weight are made possible by the use of "UNBREAKABLE" malleable iron for all bearing unit housings. The new relube type units feature self-aligning ball bearings secured to the shaft by two setscrews and a wide inner ring. All pillow blocks have elongated bolt slots for wide adjustment and maximum interchange. Booths 252-254.

Circle 318 on postcard for more data

TRABON ENGINEERING CO.

MIST OIL SYSTEM—The Trabon Meter-Mist Oil Lubrication provides a method of lubricating bearings and gears where the oil-mist or fog principles is desired. An outstanding addition to this family of centralized oil and grease systems, Meter-Mist provides adequate lubrication for all types of bearings and is particularly suited for high speed spindle applications. Mist, a recent concept in lubricant transmission, is micron-



sized lubricant particles suspended in air, conveyed to the bearing through extremely low pressure air lines where it is converted to larger sized oil particles by reclassification fittings and caused to "wet-out" with impingement upon the bearing surface. Booth 155.

Circle 319 on postcard for more data

SUNNEN SERVICE CORP.

HOLE GAGE SET-This gage combination is reputed to be extremely versatile for inspection and quality control work. It measures all bores from % to 3 in. directly in thousandths, tenths of thousandths and millionths. Readings are instantaneous and accuracy is independent of operator "feel." No racks, pinions or gears are used in the friction free full floating reed type mechanism. Built-in overload protection prevents jamming during setting and use. One thousand to 1 magnification moves the indicating pointer one inch across the gage's scale for each 0.001 in. variation in bore size being measured. Graduated in ½ tenths (fifty millionths) the linear scale provides a reading range of 0.005 in. It can easily be read to ¼ tenths (0.000025 in.) by visually splitting the 1/2 tenth graduations. Booth 327.

Circle 320 on postcard for more data

This unit will handle 90 deg corner notching up to 5 by 5 in. in 16 gauge mild steel as well as rectangular, radii, vee and special edge notches. The new machine will do straight line nibbling and contour shearing at 165-strokes per minute with a capacity of 1/e in. mild steel. A single switch permits instant changeover from single stroke punching to nibbling.

Circle 321 on postcard for more data



WALES STRIPPIT INC.

PUNCH PRESS—Among the equipment which will be exhibited is the Super 30 Fabricator. This machine is a single station, high speed punch press with a throat depth capacity of 30 in. For straight line punching, it will handle a 30 in. workpiece of any length, utilizing the Strippit

multiple-stop gaging system. For production punching with the Strippit Duplicator, its maximum work size is 30 by 30 in. Hole punching capacity ranges from a $3\frac{1}{2}$ in. hole in $3\frac{1}{3}$ in. mild steel to a $3\frac{1}{4}$ in. hole in $1\frac{1}{4}$ in. mild steel with a tolerance of ± 0.005 . Booth $3\frac{1}{4}$ 0.

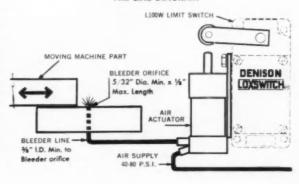
HAMILTON MANUFACTURING CO.

DRAFTING TABLE—Two new table designs are included in the comprehensive drafting room equipment display planned by Hamilton in their booth. A Four-Post model, the CL100 Series, incorporates the beauty of sahara tan finish with the modern styling of canted leg design. Stability is maintained by using only front and back cross rails. Less structural members simplifies floor maintenance.

A Strata-Core drawing board is equipped with a channeled steel cleat for accuracy and is surfaced with glare-proof mist green linoleum. The table has steel drawer bodies with wood fronts to match table finish. Satin chrome handwheels control hidden tilting rods for board adjustments from 0 to 40 deg. The table is offered in four board sizes and two heights. Booth 154.

Circle 322 on postcard for more data

THE R. B. DENISON MFG. CO.



LIMIT SWITCHES This new device, to be introduced at the show, requires no air valve or air switch and therefore permits actuation in inaccessible places, and allows the use of a heavy duty limit switch with dependability and long life characteristics. Actuation is provided by an orifice 5/32 in. in dia, which may fre-quently be built in existing equipment, thus requiring no space whatever. Booth 406. Circle 323 on postcard for more data

PRODUCTION ENGINEERING SHOW

ETTCO TOOL AND MACHINE CO.

DRILLING AND TAPPING HEADS—A fully adjustable 4-spindle drilling and tapping head, known as the 400 Knuckle-Head, was developed to perform small delicate production operations. The 400 is designed to



operate in any position on any drill press, drilling or tapping unit or machine. It will either drill or tap from 2 to 4 holes ranging from 1/32 to ¼ in. in steel. Spindles on this new head are of the universal joint type and can be adjusted to almost any hole pattern within a 4 in. dia bolt circle with a 5 in. minimum center distance. Special spindles allowing a ½ in. minimum center distance are also available. Booth 247.

Circle 324 on postcard for more data

OWATONNA TOOL CO.

HYDRAULIC PUMP—A new, two-stage hydraulic pump—a complete power package—which delivers from 600 cu. in./min. at 100 psi to 50 cu in./min. at 10,000 psi and weighs 45 lb will be shown by a division of Owatonna. The pumping unit is a quiet-operating, precision-built, two-stage unit, driven by a universal motor, and consisting of a gear pump for the low pressure stage and a five-cylinder axial-piston pump (which is supercharged by the gear pump) for the high pressure stage. Booth 435.

Circle 325 on postcard for more data

THE ZERO-MAX CO.

DRIVES—The new 400 series of Zero-Max stepless variable speed drives are the result of thorough redesign of exterior case and several key operating mechanisms. These drives are available with or without motor, with or without reverse, and with or without gearhead. All variable speed drives are for use with fractional horsepower motors. Speed can be changed at any time, running or not. Speed can be cut to true zero without shutting off the motor. Booth 250.

Circle 327 on postcard for more data

THE SKINNER CHUCK CO.

HAND INDEXING CHUCK—This new hand-indexing power chuck is designed for machining fixtures, valve bodies, universal joints and similar items that require multi-sur-



face machining or grinding without releasing. The jaws can be indexed under full pressure without touching the work. Indexing is accomplished by means of a slide plate and Allen Wrench. Booths 212 and 214.

Circle 328 on postcard for more data

DIEHL MFG. CO.

NUMERICAL CONTROL - Production accuracy of up to ± 0.0002 in. on a 40 in. work table, flexibility achieved through modular design, and economy are advantages of a newly-developed numerical control system which is to be displayed for the first time. A notable feature of the control is its economy of operation provided by modular design. Modular components include a tape reader, distributor, digital analog converter, notch phase discriminator, mechanical module, position indicator control and servo-micrometer. Booth 136.

Circle 329 on postcard for more data

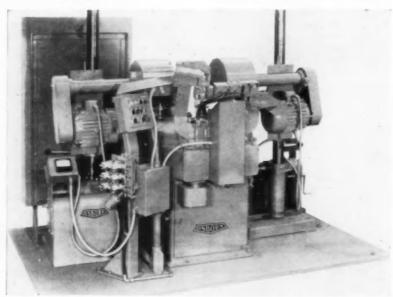
Turn to page 112, please

THE OSBORN MFG. CO.

FINISHING MACHINERY — Metal finishing machinery designed for use with manual, semi-automatic or completely automatic operations will be the keynote of the Osborn Manufacturing Company exhibit. It will include a display of its "Building Block" concept as applied to metal finishing machines. Basic machinery components, completely independent and

self-contained, are integrated to make a complete machine tailored to the specific needs of each manufacturer. As an example of this flexibility, Osborn will have in operation its 5630-2M1A Automatic Finishing Machine. This machine tool is built to satisfy the requirements of a complete automatic production cycle. Booth 375.

Circle 326 on postcard for more data



This unit can be used to finish parts up to 30 lb and 14 in. in dia.



SPRAY PAINTING NOTES

Binks 19J spray gun cuts bleed-off losses 65%



Mechanical characteristics of Binks gun illustrate how Model 19J can bleed-off with 65% less

In multiple color painting operations spray guns are frequently changed from one color line to another. The new color is run through the gun to clean out the old. In ordinary guns it requires an average of 7 to 10 fluid ounces to bleed a gun until there is no intermix danger. With the Binks Model 19J spray gun paint lost in bleed-off is only 2 to 4 ounces, a 65% reduction in waste. The Model 19J is an efficient, dependable production gun, ideal for automotive use where speed and economy are so important.



Binks circulating system gives positive color control!

Binks circulating systems improve the handling and control of finishes in production line operations. Colors can be mixed to formula in central mixing areas and pumped through pipes to individual spray painting stations throughout the plant. Binks air and fluid pressure regulators, for each color at each station, give positive control of application rate and assure uniformity from unit to unit.



Binks spray painting equipment...

Cuts KW-Dart truck finishing time improves working conditions

"Our finishing production went up 25% and costs dropped by 10% after installing Binks spray painting equipment," reports Mr. Willard Cline, KW-Dart Truck Company superintendent of production.

Working conditions improved.

In each of two painting areas, Binks water wash spray booths provide positive removal of overspray and fumes. Painters work steadily without having to take time out for a "breather.

All-weather air-intake system.

Air intake ducts to spray areas are filtered to keep out finish-damaging dust and dirt. In win-ter, intake air is heated to 75°F by steam pipes in the ducts.

Spray guns stay clean longer. Binks Model 18 spray guns used in degreasing, priming and enameling operations resist clogging. Spray patterns stay perfect, enabling faster coverage with less work. Spray gun clean-up, when it is needed, is fast and easy.

Binks installation bonus.

The cooperative assistance provided KW-Dart Truck by Binks field men-from installation design, equipment set-up and operation follow-through-turned economical standard equipment into a custom installation.

Send for Catalog 956.

See the broad range of manual and automatic Binks spraying equipment available for economically modernizing your finishing operation. Ask your

Binks industrial distributor or Binks Branch Office for a copy, or write direct.



Ask about our spray painting school Open to all . . . NO TUITION . . . covers all phases.











SPRAY PAINTING

Binks Manufacturing Company 3120-30 Carroll Ave. West, Chicago, Ill.

REPRESENTATIVES IN PRINCIPAL U.S. & CANADIAN CITIES . SEE YOUR CLASSIFIED





NO HEAT TREATING REQUIRED with

La Salle e.t.d 50

ALLOY STEEL BARS
GUARANTEED 150,000 PSI tensile strength

- 150 alloy machines better than heat treated in-the-bar alloy steels!
- 150 alloy has exceptional uniformity!
- 150 alloy simplifies production!

Quality and Cost-reducing Advantages!

- (1) Heat treating with its attendant costs and hazards is eliminated.
 (2) No quench cracks or distortion due to heat treating. (3) Machinability is greatly improved by the acicular pearlitic-ferritic structure.
 (4) Tool life and finish are excellent. (5) Production is simplified . . . secondary operations following heat treat are eliminated. (6) Part quality, uniformity and reliability are maintained or improved.
 (7) End cost is greatly reduced.
- Ask for a sample test bar

Send a blueprint . . . or write us giving application details.

What is e.t.d. 50 alloy?

"e.t.d." 150 is an alloy steel bar made by the exclusive and patented Elevated Temperature Drawing process to a guaranteed minimum tensile strength of 150,000 psi and a hardness of Rc 32 minimum. Strength and hardness are uniform across the section of the bar. The uniform pearlitic-ferritic structure of "e.t.d." 150 alloy eliminates the problems associated with non-uniform quenched and tempered structure. Ideal for shafts, gears, pinions, fasteners and other parts now being heat treated or made from heat treated in-the-bar materials.

SPECIFICATIONS

Ultimate Tensile Strength Yield Strength (.2% offset) Proof Stress (.01% offset) (1½" Rd. and smaller only) Elongation—Approx. only Reduction of Area— Approx. only Brinell Hardness Number Rockwell "C" Hardness 150,000 psi minimum* 130,000 psi minimum* 120,000 psi minimum*

10% -20%

35% -45% 302 minimum* 32 minimum*

*GUARANTEED MINIMUMS. In event of disagreement between hardness and tensile strength, the tensile strength shall govern.

The same of the state of the state of the state of the state of the same of the same of the state of the same of

Use this coupon to ask for helpful data bulletin

La Salle STEEL CO.

1438 150th Street Hammond, Indiana

Please send Helpful Data Bulletin No. 22, "e.t.d. 150 alloy steel bars eliminate heat treating of parts."

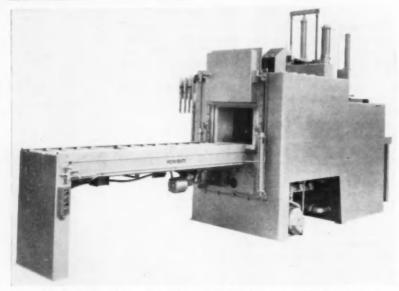
Name______Title_____

Company_____Address

City_____Zone___State__

PRODUCTION ENGINEERING SHOW

Continued from page 108



Newly developed furnace is designed for automatic heat-treating operations

HEVI-DUTY ELECTRIC CO.

HEAT TREAT FURNACE—Hevi-Duty will feature a new and improved clean-line automatic heat treat furnace at the Production Engineering Show. It is particularly useful in the treatment of parts for the automotive, aircraft and related industries where high volume and quality control must be maintained. The furnace reduces handling, provides single unit heat treating and makes possible step-by-step quality control in bright hardening, carburizing, carbonitriding, annealing and normalizing operations. This unit automati-

cally handles five operations in a straight-through heat treating process. A pusher arm on the loading table directs work baskets into the heating chamber. With cycle timers and controls set, the load is brought up to the correct operating temperature and maintained at this level for the prescribed treatment time. After treating, an automatic transfer arm, with its mechanism located under the loading table, moves the work basket from the heating chamber into the quench chamber. Booths 368 and 370.

Circle 332 on postcard for more data

MAY-FRAN MFG. CO., DIV. OF FISCHER & ASSOC., INC.

SCRAP REMOVAL CONVEYOR-This unit, named the Chip Tote conveyor, permits complete utilization of high production machine tools by eliminating periodic shut-down for manual scrap removal. Hot, wet or dry chips, borings or turnings can be removed from all types of machine tools while they are in operation. These conveyors are available in a wide range of sizes for attachment to all types of machine tools regardless of space and load requirements. They are fabricated from standard mass-produced component parts. Width, length and angle of incline can be modified to meet the demands of each installation. Speed of operation can be synchronized with the metal-removal capacity and rate of

coolant flow of the machine to which it is attached. Booth 455.

Circle 333 on postcard for more data

EMPIRE CORP.

LAPPING MACHINE-An improved tool lapping machine with abrasive recirculating pump is announced by the Empire Corporation. The machine provides economical resharpening of carbide and ceramic tools. Full length and throwaway type tools can be resharpened with equal ease, according to the manufacturer. This entire unit requires 18 by 24 inches of bench space, operates on 110 volt, AC current and requires only 200 watts of power. Loading and unloading operations are manual while grinding is automatic. The abrasive compound is recirculated and reused until worn out. Booth 379.

Circle 352 on postcard for more data

VICKERS INC.

FEED PANEL—A new traverse and feed panel provides a compact and precise control unit for the many drilling, boring, reaming and milling operations in modern industry. It incorporates solenoid controlled directional movements, and cam actuated coarse and fine feed rates for maximum tool efficiency. Provision has been made for separating the mechanically actuated portion of the panel from the solenoid controlled directional unit. This allows the panel to be mounted on the machine tool



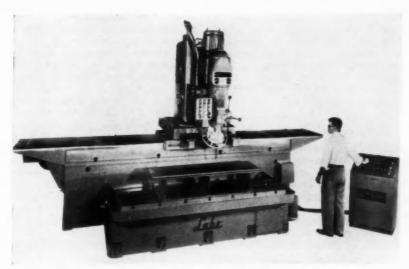
slide in a very small space, with the electrical actuating control at a remote position. In keeping with the proposed machine tool building block concept, these controls can be integrally mounted on all but the smallest of the proposed standard units. Booth 107.

Circle 330 on postcard for more data

GENERAL RADIO CO.

ELECTRONIC EQUIPMENT-A variety of industrial electronic products developed for manufacturers, designers and users of machine tools and other production equipment, will be exhibited at the Production Engineering Show. One of the exhibit highlights will be a completely new version of the stroboscopic tachometer, sold under the trade name, Strobotac®, and used in the mechanical and electrical industries for the measurement of rotating machinepart speeds and the study of their operation in slow motion. Small and portable, the new model (Type 1531-A) features a fundamentalspeed (flashing-rate) range of 110 to 25,000 rpm and brilliant white flashes with extremely short duration (1 to 6 microseconds) so that fast action can be 'stopped.' Booth 630.

Circle 331 on postcard for more data



Lahr special drilling machine with six-face turret head is driven by Reliance two-axis, point-to-point programmed numerical control drive system. Machine will be debuted at The Production Engineering Show.

Circle 334 on postcard for more data

RELIANCE ELECTRIC AND ENGINEERING CO.

NUMERICAL CONTROL - A reliance two-axis, point-to-point programmed numerical control system will be applied to a special large drilling machine with a six-face turret head to be displayed. This machine has a 90-in.-long fixed table over which is mounted a Brown & Sharpe model B six-face turret drilling head which has 90 in. of programmed movement in the longitudinal axis, and 20 in. of programmed movement in the transverse axis. The spindle feed, or Z axis, of this machine will not be programmed; however, turret selection will be. The

numerical input data to the control system will be in the form of either one-inch-wide, eight-track punched tape or manual rotary switches. Decimal readout of the input data is provided by numerical indicator tubes. Numerical indicator tube readout of the turret face selected will be provided, as will a dial switch to allow manual selection of the turret face. Full-range zero offset control will be provided for both table and saddle motions, thus allowing the zero datum lines and to be set to any position desired. Booths 411, 413, 415, and 417.

THE CUSHMAN CHUCK CO.

PRECISION CHUCKS - The highlight of The Cushman booth will be a number of special chucks engineered and built to solve particularly difficult workholding and machining problems. These chucks are duplicates of those now actually providing their users with benefits of highly efficient production at low costs on both long and short runs. Among the special chucks on display will be the 2-Jaw Index Chuck, which has enabled manufacturers to maintain close tolerances, achieve a marked improvement in product performance. Also shown will be the Tubing Chuck designed to hold large diameter, thinwall tubing for precision machining. Booth 128.

Circle 336 on postcard for more data

TORIT MFG. CO.

FILTER SHAKER-A newly developed, highly efficient automatic filter shaker is now available on all models of Torit cloth filter type dust collectors. The automatic shaker is powered by an independent electric motor mounted on the side of the collector. When the shake bar is oscillated horizontally, its metal fins strike each cloth filter bag to free the dust particles and cause them to drop into the dust tray. Shaking action begins automatically whenever the collector motor is turned off. After shaking the filters for two minutes, the mechanism shuts itself off and will not operate again until the collector has been turned on and off again. Booth 401.

Circle 337 on postcard for more data

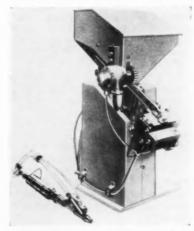
THE ARCAIR CO.

METAL REMOVAL-Recognized for versatility of operation, the Arcair Model H-3 torch is employed in a wide variety of metal removal jobs. The Model H-3 is a general purpose tool designed to use up to % diameter electrodes. Compressed air is directed at the work through two orifices in the adjustable head. The air supply is controlled with a push button on-off valve in the torch handle. which remains in either position once it is depressed. Carefully insulated construction of this metal remover insures long torch life. The welding machine connection lead is covered by a special rubber boot which permits a quick change connection of power to the torch. Use of Arcair copperclad electrodes, either AC or DC, provides assurance that metal removal job costs will be cut up to 80 pct; according to the company. See this metal removal torch in actual operation using copperclad electrodes at the Production Engineering Show. Booth 460.

Circle 335 on postcard for more data

PARKER-KAYLON

SCREW FEEDER DRIVER—The new JS-60 model is completely redesigned, with a cover housing that protects the inner mechanisms. It is easily portable to any point of the production line, and can be speedily connected to any suitable air line.



Adjustable for use with screws of any dia from number 2 through 14, and is also convertible to any driver such as Phillips, slotted, hexagon, or clutch, and any head style. In addition, this unit feeds and drives preassembled fastener-washer combination such as Sems. Booth 489.

Circle 338 on postcard for more data

PRODUCTION ENGINEERING SHOW

A&A MFG. CO. INC.

BELLOWS—An all new method of fabricating bellows-type, pliable protectors will be shown for the first time at the Production Engineering Show. These new, accordion type bellows are formed by vulcanizing the edges of neoprene coated nylon ma-



terials. The Vulca-Seal process allows the manufacturer to fabricate a fully oil-tight and air-tight bellows without the use of molds. Protectors can be made in any size or shape to cover piston rods, spindles, vertical or horizontal screws, all shapes of machinetool ways and cross-rails. Booth 481.

Circle 339 on postcard for more data

COGSDILL TOOL PRODUCTS, INC.

PRODUCTION TOOLS-Five costsaving, time-saving tools of particular interest to the metalworking industry will be shown by Cogsdill at the show. One of these new tools performs three operations simultaneously. Designed for screw machines or tube-finishing machines, the Tu-Burr, as it has been named, chamfers both OD and ID and faces tube ends. Blades are interchangeable to handle any angle chamfer or form; model capacities range up to 21/2 in. OD. Another device to be shown is the self-contained ContourBurr which does a consistent job of chamfering inside edges of tubing cross holes. A tapered collar slips over the tubing while the pilot passes through the hole. Bottoming of the tool forces the blade out of the pilot. A cam causes the blade to slide up and down so that it traces and shaves the internal edge of the cross hole. The Contour-Burr can be mounted in any available spindle, giving burr-free chamfer on holes up to 1/2 of the tubing OD. Booth 515.

Circle 340 on postcard for more data

FURNAS ELECTRIC CO.

MAGNETIC STARTERS — Furnas Electric will display new design magnetic starters through 30 hp 550 V polyphase. Completely redesigned, these controls are smaller in size than previous models and feature

simplification. A unitized type of construction with all parts being front removable speeds up inspection and maintenance. All components can be removed by releasing only one or two screws. Booth 511.

Circle 341 on pestcard for more data

HOFFMAN ENGINEERING CORP.

CONSOLE CABINET—A new model 14 console cabinet for mounting electrical and electronic machine controls will be shown. Designed for industrial use, the unit is oil and dust tight and is made of 14 gage steel. All seams are welded and the doors and panel have neoprene gaskets. The sloping top has a hinged, removable

panel on which the user can mount control buttons, switches and meters. This panel is at operator level, 32 in. from the floor. One or two 24 by 18 in. sub-panels can be installed inside the console body. Either stationary or swingout panels are available for this purpose. Vertical racks are also available for mounting electronic chassis inside the body instead of sub-panels. The chassis will slide out through the opened front door of the console. There is another door in the rear of the console for added access to sub-panels. An optional writing desk for operator use can be attached to the front of the body. The console is 50 in. high, 24 in. wide and 23 in. deep. Booth 408.

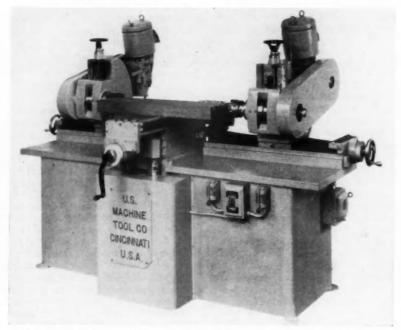
Circle 342 on postcard for more data

U.S. BURKE MACHINE TOOL CO.

DUPLEX HALF-MILL-The U. S. Duplex Half-Mill, as pictured, combines two highly flexible Half-Mill heads positioned in this instance to permit simultaneous milling of both ends of an extended machine tool casting. Although the cut is light, large cutters are used, necessitating slow spindle speeds. To achieve this, in place of a conventional gear motor, a flange-mounted 1800 rpm motor attached to a worm and wormwheel (10 to 1 reduction) speed reducer is employed. Spindle speeds provided are 86, 112, 143, 218, 278 and 360 rpm. The standard Half-Mill is

available with a 1200 rpm motor for selective spindle speeds up to 2370 rpm, or with other type motors for selective speeds to 5000 rpm. Efficient for slotting, sawing, face milling, keyway cutting, slab milling, boring and many other operations, the Half-Mill is being utilized in high production applications equipped with air-hydraulic head and/or table feed, as well as standard slides. It is offered with 12, 18, 24 and 30 in. air hydraulic or 18 and 30 in. full hydraulic longitudinal table feed. Booths 241 and 243.

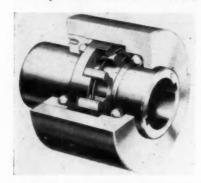
Circle 343 on postcard for more data



The table, on which the fixture is secured, may be manually positioned longitudinally.

FORMSPRAG CO.

BASIC CLUTCHES — Highlighting Formsprag's exhibit will be its newly developed Rev-Lok, a dual torque-locking and positioning device. It features two opposing sets of full complement sprags which completely block the possibility of reverse torque feedback to the input shaft. It operates both clockwise and counter-clockwise to drive, position, over-run and backstop. Other units to be shown



will include high-performance overrunning clutches, high-performance indexing clutches, hold-back clutches, high-speed backstopping assembly complete with oil reservoir, its general purpose series, and the Rawson line of all-metal centrifugal clutches. Booths 323 and 325.

Circle 344 on postcard for more data

FARRAND CONTROLS

NUMERICAL CONTROL SYSTEM
—This exhibitor will demonstrate a
new transistorized inductosyn numerical control system designed to fulfill
the requirements of the Machine Tool
Industry for a simple to operate and
easy to maintain system which occupies a minimum of shop space. In
addition to punched tape input for
automatic operation, the system can
be operated by manual input from
rotary switch controls. Also shown
for the first time will be the allmetal inductosyn sliders, scales, rotors and stators. Booth 103.

Circle 345 on postcard for more data

SUPREME PRODUCTS CORP.

TAPPING ATTACHMENT — Visitors to the Show will have an opportunity to study and work with two models of a new tapping attachment that have been developed. Supreme's new tapper, called "VersaTAPPER," can be used on any drill press. With it tapping is practical in any material and at any dia from 0 to ½ in. The unit works equally well on tool

steel, mild steels, and nonferrous materials. The principle of operation is quite simple. The unit contains a 4 to 1 planetary gear reduction system. From this, power is transmitted to the forward and reversing clutch members by means of a bevel gear train. When the thrust is down -into the work-the forward clutch engages. When the drill press lever is raised, the reversing gear is engaged and tap backs out easily. There are two models of Versa-TAPPER. Model 6100 has a straight shank and is held in the regular 1/2 in. drill press chuck. Model 6200 has a number 2 Morse Taper Arbor for attachment directly to the drill press spindle. Others items of the Supreme line will also be on display. Booth 226.

Circle 346 on postcard for more data

BROOK MOTOR CORP.

MOTOR LINE—A recently designed line of open drip proof ac electric motors, from 1 to 600 hp, with



greater capacity for "breathing" to assure cooler operation, will be displayed at the show. Vents below the terminal box provide intake of cooling air in addition to the vents in the end bells. Internal deflectors shield the vents against admission of vermin and debris. Other features include: pre-loaded ball bearings fitted at both ends. Extra large lubricant reservoir in the bearing housing, and an aluminum rotor mounted on high tensile steel shaft and electronically balanced. Booth 601.

Circle 347 on postcard for more data

MICRO-POISE ENGINEERING AND SALES CO.

TWO-PLANE MACHINE — Micro-Poise will be exhibiting a new two-plane dynamic machine designed for high speed parts where tolerance is extremely critical. Electronic circuits are designed to handle two-plane balance in a simple operation that allows high production rates. In addition

to this unit there will also be displayed the model 6780 balancing machine. This unit will be equipped with a drill press for an actual dem-



onstration of on-machine correction. It also incorporates a new vacuum chip remover which speeds the correction operation. Booth 145.

Circle 348 on postcard for more data

THE FAFNIR BEARING CO.

BALL BEARINGS—On display will be a complete line of special and super-precision ball bearings at The Production Engineering Show. Fafnir special and super-precision bearings, designed especially for high speed and critical applications such as machine tools, are available in many types and sizes, and with the capacities, tolerances, contact angle and retainer designs to solve all bearing problems. Skilled application en-



gineers will be on hand at the show to aid customers with the application of ball bearings to their particular needs. Booth 217.

Circle 349 on postcard for more data (Turn to page 118, please)

Readers of
AUTOMOTIVE INDUSTRIES
are always well informed

You can step up shop efficiency with SEIBERT TOP-QUALITY PRODUCTION TOOLS



PRODUCTION HOLDING TOOLS

Advanced design, precise workmanship, fine materials, quick service - these are the money-saving advantages of Seibert Production Holding Tools. And because of them, an excellent reputation has been built for these tools in plants throughout the country. Improved machining and other production methods make possible their quantity manufacture to precise tolerances from fine alloy steels, without increased cost to the user. In addition, this efficient production permits meeting customer requirements with unusual promptness.

Drill and Tap Drivers







Tool Board for preset-ting, storing. Boards also for storing qualitycontrol gages

Tool Control







TOOL-CONTROL SYSTEMS

Seibert Tool Control Systems cut downtime by having preset tools immediately available for quick changes. They save workers' time by providing systematic storage for preset tools, presetting gages, and quality-control gages. In addition, the metered boards prevent excessive parts spoilage by stopping the machine when tool changes are required. Such systems, engineered to meet specific needs, are making almost unbelievable savings in mass-production plants.

SPINDLE EQUIPMENT

The Seibert Spindle Service is complete, providing not only quality equipment, but everything from standard slip spindles through lead-screw tapping spindles, and specials to meet individual needs. And when a machine is equipped with Seibert Spindles, its accuracy and versatility are enhanced and its useful life greatly increased. These advantages provide savings in production time and downtime. Good design, fine materials, and accurate construction are some of the reasons. Beyond these are reasonable prices, which provide immediate savings.



SEIBERT & SONS, Inc. 1008 E. 24TH STREET . CHENOA, ILLINOIS



He's mopping up the mess for the last time

At a leading aircraft research center, high-frequency vibration caused severe oil leakage from hydraulic lines servicing a huge wind tunnel. Many man-hours each month were wasted cleaning up the basement floor underneath, even though drip pans were used extensively.

Now, after a change to a Suntac oil, the vibration-caused leakage has been reduced to a point where "mop-up" is not needed. Hydraulic-fluid consumption has been cut by 4000 gallons a year. That's economy! That's Sun quality—the best economy of all.

If your plant is troubled with a leaky system, a Suntac antileak hydraulic oil can save you money, too. Ask your Sun representative to show you the Suntac desk-top demonstration, or write direct to SUNOILCOMPANY, Philadelphia 3, Pa., Dept. AA-9. In Canada: Sun Oil Company Limited, Toronto and Montreal.



MAKERS OF FAMOUS CUSTOM-BLENDED BLUE SUNOCO GASOLINES



For industrial, automotive, aircraft and missile applications

Kohler quality is based on experienced engineering, skilled workmanship, complete facilities in one plant under unified supervision. Ultra-sonic cleaning facilities available. Hydraulic system components are assembled, tested and packaged in dust controlled area for minimum contamination.

KOHLER CO. Established 1873 KOHLER, WIS.

Send for catalog with complete data on:

CHECK VALVES Cone Type **Soft Seat Type**

AIR VALVES

Swing Type

PRESSURE RELIEF VALVES

NEEDLE VALVES ENGINE PRIMERS

JET ENGINE PARTS

RESTRICTOR VALVES PLUG VALVES

KOHLER OF KOHLER

Fixtures + All-brass Fittings + Electric Plants
• Air-cooled Engines + Precision Controls

Circle 181 on Inquiry Card for more data

PRODUCTION ENGINEERING SHOW

(Continued from page 115)

THE MAGNAFLUX CORP.

TEST INSTRUMENTS-The type NQ-242 Magnaflux testing unit is a standard (magnetic particle) unit specially tooled with loading tray, positioning fixture, bath applicator, and automatic magnetizing circuit for production testing of ferrous parts up to 24 in. long. Suspended magnetizing heads and coil permit conveyors to be positioned either across or through the unit. The Magnatest FS-310 instrument will be demonstrated with integrated parts feeder and 2-way automatic sorting gate. Symmetrically shaped parts may be segregrated according to hardness, alloy variation, heat treat condition, etc. An acceptable part is placed in one coil, used as a reference. All other parts pass through the test coil which senses variations from the reference part. An electronic switch activates the automatic sorting gate. Also displayed will be a new portable ultrasonic thickness measuring instrument. This is a fully transistorized battery-powered Sonizon SO-300. This direct-reading unit measures thickness of steel, brass, nickel, copper, aluminum, and almost every other material which transmits ultrasonic sound. By placing a probe on the surface of the piece to be measured and rotating a dial, the SO-300 gives an instantaneous reading of thickness. Booth 400. Circle 350 on postcard for more data

THE LUFKIN RULE CO.

NEW MICROMETER-A new large diameter micrometer head. No. 1011. that is designed for applications requiring extra-fine adjustment such as electronic equipment will be displayed by Lufkin. It is also used on special gages and tools, fixtures, and various machine tools. It reads from left to right-the spindle recedes into the heed as the reading increases. It is also available with markings on hub reading both ways. The specifications for the new No. 1011 Large Diameter Micrometer Head are as follows: measures by 10,000ths inch, range is 0 to 1 inch, spindle length at 0 in. is 11/8 in. spindle diameter is 0.270 in. clamping surface length is 34 in. and diameter is 0.7505 in. Booth 426.

Circle 351 on postcard for more data

YOU CAN DEPEND UPON PM



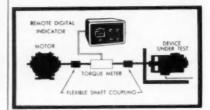
ACCURATE DIGITAL TORQUE INDICATOR

Just ONE model from PM's family of null-balance servo type instruments

Gives direct readout of torque from rotary shaft torque pickups

PM's Digital Tarque Indicator (DTI-2) is widely used in industrial and laboratory applications where high accuracy 10.19 full scale) and high reliability are essential. Its many features include a self-contained filter that integrates torque pulsations encountered in most systems. Digital readout provides a long effective scale length free from parallax. This instrument is complete in every way, even including its own strain gage power supply.

F.O.B. Detroit \$1375



Torque readings are simplified with a strain torque pickup and PM's Indicator. Note how shaft torque is measured directly with no inertial losses as may be encountered in dynamometer trunnion bearings. Torque pickups may be installed in several points of a drive train to measure progressive losses.

Other PM instruments can measure: LOAD • THRUST • TORQUE • FLOW WEIGHT . TEMPERATURE . DISPLACEMENT VOLTAGE . PRESSURE with the highest accuracy attainable in industrial and laboratory applications.



PERFORMANCE MEASUREMENTS COMPANY

15120 Third Ave., Detroit 3, Mich. Circle 182 on Inquiry Card for more data

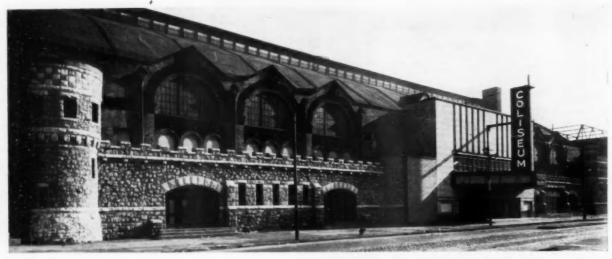
AUTOMOTIVE INDUSTRIES, September 1, 1960

ONE WAY

MACHINE TOOL AND PRODUCTION EQUIPMENT ISSUE 1960

COLISEUM MACHINERY SHOW

SECTION



MAKING PRODUCTION PAY

Chicago's Coliseum is the locale for the 2nd International Coliseum Machinery Show which will feature new machine tools and other production equipment offered by foreign as well as American manufacturers.

COLISEUM MACHINERY SHOW

The Coliseum, Chicago—September 7-15

By Charles A. Weinert
EASTERN EDITOR

THE 2nd International Coliseum Machinery Show, with an opening date of next Wednesday, September 7, will contain the latest production equipment of both American machine tool makers and producers abroad.

In addition to well-known U. S. companies, the machinery products of Great Britain, France, Belgium, Italy, and Japan will be represented in the total of some 55 exhibits.

The Show is being held in Chicago's Coliseum, located on South Wabash Ave. at 15th Street. Show hours each day will be from 1:00 to 10:00 PM—September 7 through September 15 (except Sunday, September 11).

Wearers of badges showing registration at either The Machine Tool Exposition—1960 or the Production Engineering Show will be admitted as guests at the Coliseum.

The Coliseum Machinery Show, as is also the case with the other two concurrently-held exhibitions, has the prime objective of exhibiting the newest in equipment developments for increasing production efficiency and reducing product manufacturing costs.

The Show is being produced and managed by A. Byron Perkins & Associates, Inc., Los Angeles. Mr. Perkins, president, states, "A cross-section of the exhibits reveals points of interest for plant operators and supervisory personnel far in excess of developments brought forth during any preceding year. This has been a year of machine advances. The show will be a notable one for the numerous engineering improvements in equipment produced by America and other free nations."

Exhibitors

Among the companies who are exhibiting are:

Allied Manufacturing & Sales Co.; American Pullmax Co., Inc.; Antares Instruments, Inc.; and Atlas Press Co.

Barer Engineering & Machinery Co., Ltd.; and Ets. R. Bourgeois & Cie.

Cawi Machine Co., Inc.; Cazeneuve Sales Co.; Columbia International Corp.; Comet Industries; Corpet Louvet & Cie; Cosa Corp.; and Crane Packing Co.

Decherts; The DoAll Co.; Easco Products, Inc.; and Elox Corp. of Mich.

The Fenn Manufacturing Co.; Gisholt Machine Co.; Graham Machine Tool Co.; and Grob, Inc.

E. G. Hellers Son, Inc.; Hermes Machine Tool Co.; and I. O. Johansson Co.

Kalamazoo Industries; Lapointe Machine Co.; Lennox Tool & Machine Builders; and Le Progres Industriel, Jones & Lamson Machine Co., S.A.

Machinery Dealers National Association; Marac Machinery Corp.; Masters Precision Tools; Mercuria Co.; Merrill Brothers; Mitsubishi International Corp.; and Mitts & Merrill. Inc.

Nationwide Engineering Service; Olivetti Corp. of America; Pathex Limited; and Powermatic Machinery Co.

Retor Developments Ltd.; S & S Machinery Co.; Sigma Machinery Co.; South Bend Lathe, Inc.; Speedlap Corp.; Spitfire Machine Tool Co.; and Stone Machinery Co., Inc.

Tree Tool & Die Works; Turbo Tronics; Uniloy, Inc.; Universal-Automatic Corp.; and Upton Bradeen & James, Inc.

Wells Manufacturing Corp.; W. F. Wells & Sons; Wickman Manufacturing Co.; and Winslow Product Engineering Corp.

COLISEUM MACHINERY SHOW

FOR ADDITIONAL INFORMATION please use reply card at back of issue

By C. J. Kelly

OLIVETTI CORP. OF AMERICA

CYLINDRICAL GRINDER - Model R3-300P/Y is a high precision, fully automatic, cylindrical grinder which can be pre-set to grind within 50 millionths to a positive stop without inprocess gaging. This small, fast production grinder weighs almost two tons and drives a 16 in, wheel with a 4 hp motor. It includes an 8-speed automatically braked headstock; the machine ways are hand scraped and automatically lubricated throughout. An engineering concept incorporated in the advanced design of the machine guarantees close tolerance and high finish at the highest possible production rates, according to the manufacturer. A semi-automatic universal grinding machine will be under power also, featuring new electric gaging equipment. Other items on display will be high speed sensitive precision drill presses and electric gaging accessories. Booth 609. Circle 378 on postcard for more data

CRANE PACKING CO.

LAPPING MACHINE—A completely redesigned version of the present 24 in. Lapmaster will be shown in Chicago. It is more compact to permit efficient operation in a small space, but includes a large, wrap-around adjustable work table



for rapid loading and unloading of parts from almost any position. As with all Lapmasters, the machine will lap parts of almost any shape, form or material on a production basis within tolerances of one light band or less and uniform microinch finishes of 2 to 3 rms. The model 24 features a new abrasive distribution system which maintains the correct mixture of compound to vehicle from initial filling to last drop. It provides adjustable flow control and, through pressure pumping at a constant head, assures uniform deposit at the lapping stations. Pump and tank are mounted on the inside of a

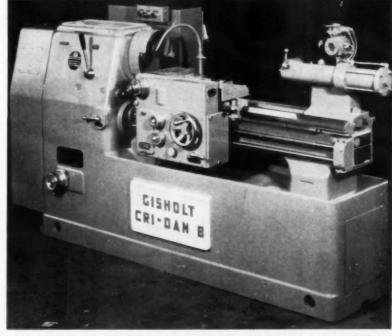
door in the machine base. Pneumatic lifts are incorporated as standard equipment to speed up loading and unloading of small and medium size parts. The lifts simplify raising and lowering of conditioning rings and/or pressure plates. A single hand-wheel permits easy adjustment of conditioning rings to compensate for normal wear patterns in the lapping plate. Booth 550.

Circle 379 on postcard for more data

GISHOLT MACHINE CO.

THREADING LATHE—The Gisholt CRI-DAN B threading lathe will be shown on representative work. A tracing attachment will be on the machine to demonstrate copy-turning of high tensile bolts and other related parts. Setups will be made during show hours to demonstrate how single—or multiple—start, coarse or fine, left—or right-hand, straight or

tapered threads, can be cut, right up to shoulders, on all types of internal and external threading operations. This machine's ability to handle material from titanium or toughest alloy steels to brass and other nonferrous metals at higher speeds and feeds due to the use of carbide threading tools, will be shown. Booth 518.



Such cost-cutting features as 15 minutes setup, fast threading rates will be brought out by demonstrations on this unit Circle 380 on postcard for more data

COLISEUM MACHINERY SHOW

CLAUSING DIV., ATLAS PRESS CO.

TURRET LATHE — Geared-head lathes, back-geared lathes, high-speed lathes, tracer lathes, semi-automatic boring and turning machines, verti-



cal milling machines and drill presses will be demonstrated at the Coliseum Machinery Show. Featured will be a high-speed turret lathe, which combines the advantages of variable speed drives and high spindle speeds with the efficiency of multiple tool statons. Some features of this machine are spindle speeds up to 3200 rpm, a 2-speed motor, variable speed drive, ASA—L-00 spindle with 1% in. through hole, flame hardened bed ways, Timken-bearing equipped bed turret, and a double tool cross slide. Booth 736.

Circle 383 on postcard for more data

COSA CORPORATION

GEAR HOBBER — COSA will occupy two booths at the Chicago Coliseum Machinery Show to demonstrate many precision machine tools and automatic production machines. The Koepfer Gear Hobber 170 is a fully automatic production machine with magazine feeding, which limits



necessary labor to loading the magazine and checking finished work-pieces. It performs equally well in conventional or climb-hobbing. The Koepfer 170 is equipped with production program control. Booth 653.

Circle 385 on postcard for more data

THE FENN MFG. CO.

SWAGING MACHINES—Five different types of swaging machines will be displayed at the show. Included will be two and four die models, a hydroformer and long die swagers. This line has a capacity on solids from 5/32 to 3% in., and tubing from 7/16 to 6 in. All machines will be operative and tooled for interesting applications. Booth 515.

Circle 381 on postcard for more data

MITTS AND MERRILL, INC.

VERTICAL CUTTING MACHINE
—Two new keyseater vertical cutting
machines are being introduced at the
Chicago Show by Mitts & Merrill.
The larger keyseater (right), new
number 6 hydraulic, has a cutting capacity of 3½ by 30 in. It will cut
internal keyways and with simple



fixturing, will cut splines, serrations, and die profiles, internal and external. Indefinitely variable cutter speeds, automatic feed and tool relief, and simplified operation and other features. The smaller, model number 1, is mechanically operated and has a cutting capacity of % by 8 in. Booth 320.

Circle 384 on postcard for more data

AMERICAN PULLMAX CO.

METAL WORKING MACHINE—According to the manufacturer the metal working unit that is to be shown in their booth is a new type, and operates on a new principle. With this unit the welding fabrication of steel plates is simplified from the results of a serrated cutting wheel which feeds the work through the machine as a predetermined bevel is cut from the edge of the plate. Units are available to cut 30, 37½ and 45 deg bevels. Booth 207.

Circle 386 on postcard for more data

LAPOINTE MACHINE CO.

INTERNAL GRINDER—Claimed by the exhibitor to be the largest display at the machinery show, Lapointe will feature 16 machines in operation. The unit pictured will be pro-

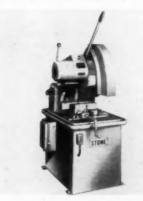


ducing precision parts to close tolerances. In addition to company personnel there will be in attendance a large group of executives and machine demonstrators representing the British companies who manufacture the machine tools. Booth 622 and 625.

Circle 382 on postcard for more data

STONE MACHINERY CO.

CUT-OFF MACHINERY—The model M-120 is designed for heavy-duty ferrous and non-ferrous cutting. Powered by a full 10 hp continuous duty ball bearing induction type motor, the unit's 20 in. blade will cut 4 in. ferrous solids and 6 in. structurals and extrusions in non-ferrous metals. Cuts are held to close tolerances with a mill-like finish at the rate of less than four seconds per



square inch. This unit is equipped with a load ammeter and overheating light and features a geared-in-head motor to provide positive power drive to the spindle with constant speed performance. Gear reduction is designed to offer maximum efficiency. Booth 326.

Circle 387 on postcard for more data

ANTARES INSTRUMENT CO.

PANTOGRAPH ENGRAVER— Model Gm 11a is designed for heavy cutting and for a wide range of general engraving, die, mold and profil-



ing operations on flat work, or by use of a forming guide on curved uniform surfaces. Though of heavy construction throughout, it is yet very sensitive in operation and can be satisfactorily used for both fine and heavy engravings. It features a large working area of the pantograph. The pantograph bars are so sturdy that no deviation will occur at any reduction ratio. Work table has longitudinal, cross and vertical feed by hand wheels fitted with calibrated drums for precision settings. Booth 123.

Circle 388 on postcard for more data

I. O. JOHANSSON CO.

RADIAL DRILL—Workpieces up to six ft in dia and four ft high can be machined on this radial. It features a 360 deg rotation and positive locks on all movements. Automatic locks and power elevation attachments have been designed so that the drill



head can be locked in the desired position radially and horizontally and yet still be moved vertically with the drill remaining square to the table within 0.002 in. in 12 in. of travel. Holes up to 18 in. can be drilled by utilizing this device. Three models have capacities up to 1% in. in cast iron. Booth 215.

Circle 389 on postcard for more data

LENNOX TOOL AND MACHINE BUILDERS

SHEARING MACHINE — The outstanding feature of Model TE-250 is its ability to cut in the center of ¼ in. steel plate without the aid of a starting hole. Also, it has a maximum edge-cutting capacity of one ga in mild steel plate and 5 ga in stainless steel. Throat depth is 49¼ in., permitting circle cutting up to 48 dia inside the throat. It cuts straight, circular, inside or irregular shapes, slots and louvers, as well as performing beading, planishing, flanging, edge bending, joggling,



nibbling and hole piercing operations. Booth 127.

Circle 390 on postcard for more data

Easy machinery cleaning



Kelite FORMULA 28*

removes oil, grease, and light carbons from hard surfaces including aluminum.

NON-TOXIC NON FLAMMABLE LOW COST WATER DILUTABLE

Corrosion safe on all common metals and all durable painted surfaces.

KELITE FORMULA 28 is the most widely used safety solvent in the automotive industry.

Safe Economical Efficient

*U. S. Patent No. 2381124



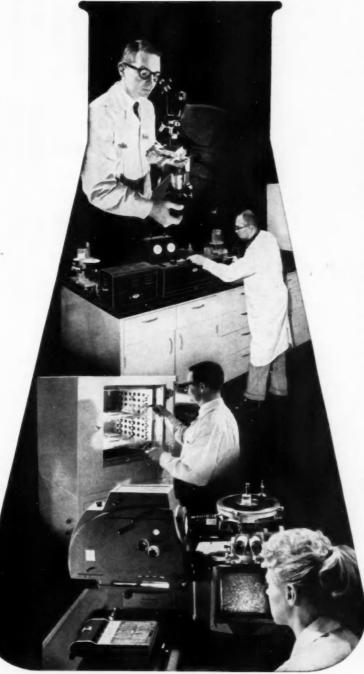


DEPENDABLY MADE parts for automotive progress • Division of General Motors, Dayton, Ohio



better batteries today-

New power supplies for tomorrow!



The 60's! Exciting, startling, enriching! Years of new advances in industry, new milestones in science, new secrets of power unlocked, a completely new standard of living for us all.

Globe-Union looks forward to the 60's - its challenges, its rewards. With a recently completed ultra-modern research center, Globe is confident of the major role it will continue to play.

Already, Globe's new technical center is carrying on advanced studies in electrochemical systems and thermodynamic reactions through x-ray spectroscopy, radiography and microscopy. In the new radio-isotope laboratory, tracer amounts of radioactive isotopes expose the course of electrochemical corrosion reactions in battery components.

A raw materials test laboratory integrates Globe's quality control program. Here incoming raw materials from Globe's 16 battery plants are precision tested.

Yes, in the 60's Globe will build even finer batteries than the best of today. And beyond the horizon? Perhaps new fuel cells, new electrochemical systems, new power sources!

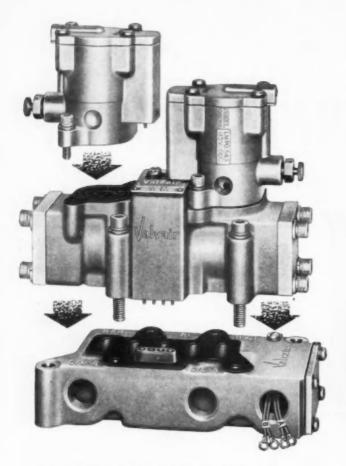
Wonderful years, these 60's!



GLOBE-UNION INC.

Milwaukee 1, Wisconsin

If it's Petroleum-powered there's a GLOBE-BUILT BATTERY right from the start!



VALVAIR 1/2 NPT PLUG-IN VALVES

MODEL PB-441 shown. 4-way single or double pilot-operated types, for sub-base or manifold mounting. Aluminum and stainless steel components assure multi-million cycle dependability. Interchangeable pilots, with coils guaranteed against burn-out for life of valve, fit any plug-in Speed King. Coils for ac or dc, any voltage... 35 — 200 psi range... integral junction box...optional manual over-ride, common or separate exhaust ports, sub-base connected external pilot supply... 34 in. exhaust ports, ½ or 34 in. inlet and cylinder ports... valve meets IIC standards.

Based on the service-proved design principle of the Speed King ¼ in. plug-in Valvair's ½ - ¾ in. plug-in valve series provides plug-in convenience and versatility to a wider range of control valve applications.

Electrical and pneumatic circuits are completed automatically when valve and pilot are plugged in . . . bolted down. The result — cost-cutting reduction of original installation and maintenance time. All power connections are made permanently in sub-base or manifold . . . there's no need to disturb piping or wiring for quick in-service maintenance.

What's more, advanced design shortens stroke... speeds response. Separate coded (4-wire) circuits on double solenoid models meet JIC requirements. Flow area through valve and sub-base equals that of full 1/2 in. pipe.

Whether your control valve applications are on the drawing board or now in service, it'll pay you to investigate the advantages of Valvair plug-in design. A call to your near-by Valvair field office will bring prompt application engineering recommendations.

For more information, write for Bulletin SPL. Address Dept. Al-960 Bellows-Valvair, Akron 9, Ohio Bellows-Valvair

The Bellows Co. - Valvair Corp. Akron 9, Ohio
DIVISIONS OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

8098-3

What HORACE DREVER has to say about Lindberg heat treating equipment





Mr. Horace Drever, internationally prominent in the industrial heating field, is a Past-President of the Furnace Manufacturers Association and President of Drever Company, furnace manufacturers and commercial heat treaters.

"For the past three and one-half years, we have been operating one of your Type 243618 GVRT Furnaces along with a 500 CFH Lindberg Hyen generator in our commercial heat treating division. We are extremely pleased, not only with the fine quality of work turned out by this equipment but also its relatively trouble-free operation. As evidence of our complete satisfaction we have ordered another Lindberg Furnace of this type."



We are happy that Mr. Drever, a furnace manufacturer in his own right, originally chose Lindberg equipment for his heat treating plant and that its satisfactory service prompted an additional order. The second Lindberg Furnace is now in production at Drever Company, as the adjacent photo shows. Bless those satisfied customers! If you have a product or process in the metal or ceramic field requiring the application of heat you can depend on Lindberg's engineering and design know-how to provide exactly the right equipment to answer your need. Get in touch with your nearest Lindberg Field Representative (see classified phone book) or write direct to Lindberg Engineering Company, 2491 West Hubbard Street, Chicago 12, Illinois. Los Angeles plant: 11937 South Regentview Avenue, Downey, California. In Canada: Birlefco-Lindberg, Ltd., Toronto.



Circle 151 on Inquiry Card for more data



Test the AUTOLITE CO-AX on your own equipment in farm, marine, earth movers, trucks, cars, diesel and industrial engines...to check its many design advantages, its plus values.

STARTING MOTORS

SO RIGHT! SO SIMPLE! SO LOGICAL! First Revolutionary Advance in 25 Years!

MORE COMPACT. Shifting solenoid located inside pinion housing coaxially with shaft. No external parts interfere with engine or accessories.

MORE ADAPTABLE. Complete range of pinion sizes and mountings meet SAE standards, plus special adaptations for custom engine designs.

MORE VERSATILE.

Rugged one-piece pinion housing designed so that a flat for terminal and switch can be machined at any point on circumference. Results: almost unlimited mounting positions; one motor can be adapted to several different engines.



MORE PROTECTION. Motor and solenoid are enclosed...not exposed to dirt, water, snow or foreign objects.

EASIER SHIFTING. Solenoid, pinion and motor switch operate in a direct line. Provides accurate and reliable motor timing.

LONGER USEFUL LIFE. Positive and automatic engagement of pinion into ring gear with noticeable absence of engagement clash means less wear, greater length of service.

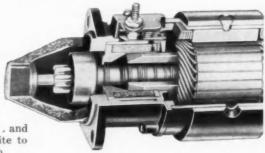
LESS SERVICING. Adequate bearings and lubrication reserves require no periodic maintenance.

PERFORMANCE RANGE. Co-Ax motors for diesel and large gas engines are conservatively rated on SAE standard and heavy duty battery curves as follows:

2.4 hp, 28 lb. ft. stall . . . to . . . 3.6 hp, 44 lb. ft. stall

2.8 hp, 35 lb. ft. stall . . . to . . . 6.5 hp, 78 lb. ft. stall

Smaller Co-Ax motors are also available with range of performance for automotive, agricultural and industrial engines.



Want to know more about Co-Ax Starting Motors... and how they can simplify engine design for you? Write to Autolite, Electrical Products Division, Toledo 1, Ohio.



ELECTRICAL PRODUCTS DIVISION Toledo 1, Ohio

· · INDUSTRY STATISTICS · ·

By Marcus Ainsworth

STATISTICAL EDITOR

WEEKLY U. S. MOTOR VEHICLE PRODUCTION

As reported by the Automobile Manufacturers Association

	Wee	eks Ending	Year to Date		
Vehicle Make	Aug. 13	Aug. 0	1960	1959	
PASSENGE	R CAR	PRODUCTION			
Total—American Meters	*****	6,066	325,153	267,758	
Chrysler		*****	53,817	50,277	
De Sote			16,377	33,969	
Dodge	3,869	528	269,469	108.950	
Imperial	-1000	020	8,663	11,930	
Plymouth	2,352	275	159,139	307,000	
Valiant	2,217	1,242	171,277		
Total Chrysler Corp.	8,238	2,045	678,742	512,131	
Comet,	7.260	6.465	102.935	26,177	
Falcon	11,129	11,539	315.016		
Ford	15,562		643,739	1.041.540	
Lincoln	305	313	12.522	18,508	
Mercury	494		97,801	101,564	
Total Ford Motor Co.	34,750	36,543	1,172,013	1,187,795	
Buick	500	90	183,218	161.076	
adillac	2,351	3.370	109.938	106.281	
hevrolet	27.624	32.626	1,157,082	1.110.61	
Corvair	2,833	4.145	170,519	6,34	
Oldsmobile	5,216	9,341	257,368	275.216	
Pontiac	3,036		308,058	300,172	
Total - General Motors Corp	41,560	59,326	2,186,183	1,959,708	
Total-Studebaker-Packard Corp		*****	70,310	98,107	
Checker Cab	110	105	4,606	2,839	
Total—Passenger Cars	84,658	104,085	4,437,007	4,028,336	
TRUCK AND	BUS	PRODUCTION			
Chevrolet	1,758	6,199	273.445	251,407	
3. M. C.	2,020	2.020	73,712	60.586	
Diamond T	46	57	1,908	3,941	
Divce	80	80	2.632	2.292	
Dodge and Fargo	308	432	46.826	50.656	
ord.	7.154	4.353	233,345	222,343	
. W. D.	14	4,000	630	650	
nternational	227	201	81, 191	92,162	
Mack.	349	319	9,841	11,071	
itudehaker	040	410	9,123	8,596	
White	326	131	11,329	12,408	
Willys	02.0	101	84.988	72.074	
Other Trucks	90	95	2,780	2,377	
	10 000	13.887	831,750	790,573	
Total-Trucks	12,372				
Total—Trucks	50	80	2,590	1,678	

NEW FOREIGN CAR REGISTRATIONS*

	JU	NE	
1960		1959	
Volkswagen. Renault. Opel. English Ford. Triumph. Austin Healey. Flat. W. G. Simca. Peugeot. All Others.	12,268 5,604 2,414 2,204 1,869 1,849 1,790 1,403 1,320 1,276 11,312	Volkswagen Renault English Ford Opel Flat Simca Hilman Triumph Vauxhall Volvo All Others	12,034 8,180 3,783 3,670 3,545 3,037 2,845 2,291 2,067 1,780 14,358
Total	43,309	Total	57,590

	SIX MO	ONTHS	
1960		1959	
Volkewagen Renault Opel English Ford Flat Triumph Austin Healey Simca. M. G. Peugeot All Others.	76,991 38,874 15,840 15,267 12,487 9,109 9,021 8,586 7,560 7,309 80,869	Volkswagen Renault English Ford Opel Simca Fiat Hillman Triumph Vauxhall Volvo All Others	54,564 38,683 22,165 19,583 18,711 18,561 14,733 11,433 11,437 9,618 72,344
Total	270,713	Total	291,772

TRACTOR SHIPMENTS

WHEEL TYPE

Hp. Ratings	June	Six Months
9-34 belt hp. 35-39 belt hp. 40-49 belt hp. 50-59 belt hp. 60 belt hp. and over	1,527 1,741 2,257 2,653 1,873	18,381 13,508 20,077 24,580 15,169
Total	10.0511	91,7052

TRACKLAYING TYPE

20-59 net engine hp.	362	4,164
60-89 net engine hp.	487	2,078
90-299 net engine hp.	151	881
Total	1,0003	7,1234

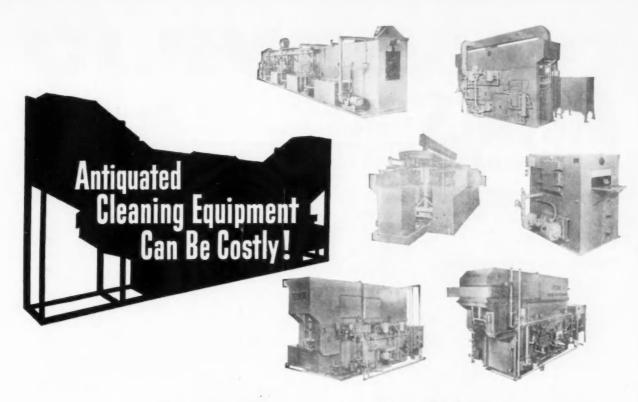
1—Valued at \$21,521,000 3—Valued at \$23,279,000 2—Valued at \$192,782,000 4—Valued at \$167,244,000

1960 NEW REGISTRATIONS*

Arranged in Descending Order According to the Six Months, 1960 Totals

NEW CARS				NEW TRUCKS							
		Six Months						Six Months			
Make	June 1960	May 1960	June 1959	1960	1959	Make	June 1960	May 1960	June 1959	1960	1959
Chevrolet Ford Plymouth Rambler Pontiac Dodge Oldsmobile Buick Mercury Cadillac Studebaker Comet	161,284 117,685 43,652 41,158 35,288 36,177 28,360 22,096 13,018 11,966 9,608 17,583	171,779 131,721 46,016 43,822 39,875 39,356 33,660 25,736 14,280 12,875 11,293	146,009 140,501 40,542 36,449 37,594 15,421 34,575 21,325 13,310 11,878 12,175	887,671 725,695 238,940 219,232 207,911 193,312 176,254 135,437 81,702 76,488 59,013 55,216	757,050 735,179 196,785 176,840 201,061 72,685 194,882 134,933 76,962 75,943 68,571	Chevrolet Ford International G. M. C. Dedge Willys Truck White Mack Willys Jeep	29,513 24,799 10,145 7,728 3,449 1,591 1,384 991	31,261 28,190 11,013 8,292 4,098 1,542 1,644 1,117 930	30,813 25,929 9,933 5,911 5,065 1,470 1,489 1,270 838	167,213 146,992 57,998 41,101 22,015 9,550 7,994 5,983 4,979	167,787 137,146 49,340 35,183 27,679 8,640 7,753 7,121 4,235
Chrysler De Seto Lincoln Imperial Misc. Demestic Foreign	6,927 2,084 1,493 1,230 946 43,309	7,573 2,427 1,847 1,274 853 45,623	6,474 4,327 2,005 1,490 4,267 57,500	41,089 14,795 11,894 8,291 5,516 270,713	31,973 23,051 15,037 9,076 27,010 291,772	Studebaker Diamond T Brockway All Others	650 246 99 3,986	689 250 120 4,314	553 235 101 3,475	2,387 1,423 609 23,209	3,176 1,275 553 20,364
Total-All Makes	595,864	647,055	585,932	3,411,109	3,067,810	Total-All Makes	85,535	93,460	87,082	491,453	470,252

^{*} Compiled from efficial state records. Data property of R. L. Polk & Co. May not be copied, sold or reprinted without Polk permission.



Detrex will lease a machine to fit your needs exactly and economically!

It is no accident that the Detrex nameplate is found on more cleaning equipment in more metalworking plants than any other—by a wide margin. Detrex has had more than 30 years' experience in designing this equipment—has the most complete and modern facilities for producing it-has the largest and most expert field force to help install and service it. And now you can lease any of your cleaning equipment requirements from Detrex. Whether you need a machine for degreasing, washing, rustproofing, phosphate coating, paintbonding or paint stripping—whether you require equipment that is large or small-whether you desire a manual or automated operation—Detrex can supply your needs exactly and follow through with the service that means complete satisfaction.

Depend on DETREX for Every Metal Cleaning and Processing Need

- · PERM-A-CLOR NA (Trichlorethylene)
- Solvent Degreasers
- Ultrasonic Equipment
 Industrial Washers
- Phosphate Coating Compounds







CHEMICAL INDUSTRIES, INC.

World's Largest Exclusive Producer of Cleaning Chemicals and Equipment

METALS

Steel Operating Rate Still Holds at About 55 Per Cent of Capacity, Although Orders Were Slightly Higher In August

by William F. Boericke

Steel Rate Shows Only Slow Improvement

By mid-August there was little evidence of an upturn in steel activity. The operating rate was barely 55 per cent of capacity, and had scarcely varied for a month. While incoming orders were slightly higher than July, they were disappointingly slow. Automobile makers have asked that steel delivery be postponed. September should see a pickup but real substantial tonnages may have to wait until October. Steel warehouses likewise show little enthusiasm over the business outlook. Sales in the first half were 10 per cent below the 1959 period. For the whole year they may drop 20 per cent.

The outlook is frankly confusing. Iron Age notes that the first faint signs of an upturn are visible but they afford little to cheer about. Some trade observers assert gloomily that stocks of steel in the hands of most automobile makers are still fairly large. This would be confirmed by requests for deferred shipment. Demand from the construction, warehouse, farm implement, and railroad industries has been disappointing. It appears to be a volatile operating rate for the steel industry for some weeks ahead. One and two week deliveries are the usual thing. There is not much money in spot orders but producers are not turning them away. Fabricators are not anxious to tie up their capital in inventories while the mills are willing to make spot deliveries.

Another factor that clouds the general steel picture is the soft market for appliance steel. Possibility of labor trouble at Westinghouse and General Electric is causing a lot of worry that these big steel consumers might be out of the market if a walk-out occurred.

Demand for Pipe Improves

There appears to be a mild revival of interest in oil country goods, particularly pipe, but it arises from an extremely low level and reflects the need of some oil men to drill wells just to hold onto their leases rather than the urge to develop more production.

While the construction industry has not been a bulwark for steel thus far, this has been confined to the slump in housing starts. To some extent this has been compensated by big demand for office and factory buildings, good sources of steel requirements. The unfilled order books for fabricated structural steel still looks good for several months.

The cutback in steel has naturally had an adverse effect on pig iron output and iron ore shipments. Coal mines have felt the loss of demand for metallurgical coal for coke making. Scrap prices are still depressed with mill buying sparse.

Prices for Ferro-Alloys May Rise

That prices for ferro-alloys, vital for stainless and alloy steels, will strengthen in the immediate future is the opinion of the president of Vanadium Corp. Price cutting has been unusually severe this year because of attempts by ferro-alloy manufacturers to maintain capacity operations. In his opinion, inventories of stainless steel may soon be at their lowest point in 10 years. It is estimated that 34,000 tons of stainless inventories were liquidated by consumers in the second quarter and a further cut of 11,000 tons may take place in the

third quarter. Stainless inventories in the hands of mills and processors are expected to level off around 100,000 tons at the year end, a cutback of 70,000 tons since March 31. Stainless orders are now definitely picking up. Production in 1960 may approach 1,100,000 tons, only slightly less than the 1959 total.

Alcoa Raises Prices of Mill Products

Early in August higher prices for certain grades and sizes of aluminum ingot were announced by Alcoa. The increases also apply to most categories of mill products. The price hikes apply only to alloyed ingot, and not to the base price of primary aluminum. Other major producers promptly followed Alcoa's action. Another announcement that saves a lot of confusion was the decision to drop the term "pig" and quote only "unalloyed ingot." In the past unalloyed ingot has referred to prices smaller than 50 lb. There has been no chemical difference between pig and ingot but the price was consistantly quoted 2 cents higher than pig.

It seems uncertain how effective the price increases will be. Some aluminum prices have been soft, and competing secondary alloy prices have dropped considerably. Export prices at 23½ cents continue to be 2¾ cents below domestic. Aluminium Ltd. has started offering a 1 cent per pound discount on billet. It represents Alcoa's effort to sell more metal in the U. S. market. Most domestic producers have met the 1 cent billet discount.

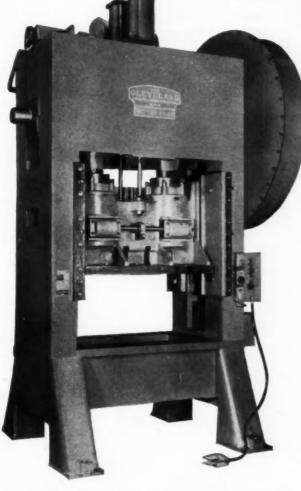
Demand Is Off

There is rather plain evidence that the bloom is off the aluminum market. Kaiser closed down one of (Turn to page 152, please)

CLEVELAND

AUTOMATION-DESIGNED • COST-CUTTING

CRANK PRESSES



Let's talk MONEY—the money you save when you have a modern, cost-cutting Cleveland Press on your production line.

First there is *Production Money*—the money you make more of due to Cleveland's versatile, dependable performance.

Next there is *Downtime Money*—the money you need never worry about with a modern Cleveland Press—ruggedly built, designed for uninterrupted production—the press that pays its way by doing its job day after day.

Then there's *Profit Money*—the money that's extra for you on every production run because your Cleveland Press is precision-built with such secure and precise stroke action that dies last longer, delicate punches can be used with minimum breakage, and your production quality is topgrade, scrap-free.

When you buy a CLEVELAND PRESS, the cost-cutting money you save plus the profit money it earns for you far surpasses the cost of replacing that old press with a modern, quality-built Cleveland Press. That's why it will pay you to look into the advantages Cleveland Presses offer.



Continuous, uninterrupted production is the "profit plus" this new Cleveland Double Crank Press is achieving at the Walker Manufacturing Company in Jackson, Michigan. This multistation, automated Cleveland Press on each stroke pierces, extrudes and forms muffler heads at the rate of 45 strokes per minute (adjustable to 55 s.p.m.). This 150-ton press has a 48" x 36" bed and slide area, 8" stroke of slide with 6" adjustment, electrically controlled air-operated Cleveland (patented) Drum Type Clutch with spring loaded brake, auxiliary air brake on flywheel, and completely enclosed gears running in oil.



Write Today for Double Crank Press Catalog SD2-60

A-2159A



E. 40th and St. Clair Avenue, Cleveland 14, Ohio

If Your Product Uses Seats...



Select Advanced Styling

Custom-designed seats, made exclusively for your mobile equipment, will keep your fine products years ahead in eye and sales appeal.

Maintain Proved Quality

Expert craftsmanship and thorough inspection assure you of the exact type of controlled quality that will provide you with every profitable advantage.

Specify When Unmatched Engineering

Our skilled engineers, all highly-qualified to give you complete recommendations, may hold the answer to your seating design and production problems.

Write, Call or Wire for Specific Data

MILSCO MANUFACTURING COMPANY

2740 North 33rd Street • Milwaukee, Wisconsin
Circle 155 on Inquiry Card for more data

Manufacturers' News

Quality Control Enlarged

Aluminum Extrusions, Inc., of Charlotte, Mich., has enlarged its Quality Control Dept. and increased production capacity by 25 per cent. The concern serves such diverse industries as appliances, building, electrical, electronics and furniture. The company added 40,000 sq ft of manufacturing space. In enlarging the Quality Control Dept., it added new equipment, a physical testing laboratory and specially-trained personnel.

Eaton Research Center

Eaton Mfg. Co. plans a new and expanded research center in Southfield, Mich, near Detroit. John C. Virden, chairman and president, said the new facilities will provide 50 per cent more working area than the present Detroit facility which it will replace. The new structure will cost about \$1.2 million for building and equipment. It is expected to be completed late this year.

Du Pont Nylon Expansion

New facilities at its Richmond, Va., plant which will more than double production of nylon yarn for tire cord and other industrial products have been announced by E. I. du Pont de Nemours and Co. Du Pont said that with completion of the work late in 1961, the plant's capacity to produce nylon yarn would exceed 100 million lb annually. Du Pont also makes tire cord yarn at Chattanooga, Tenn., and Seaford, Del.

Budd Acquires Metrol, Inc.

The Budd Co. has acquired the assets of Metrol, Inc., Pasadena, Calif., manufacturers of electromagnetic non-destructive testing equipment. Metrol will continue to operate in California, and Richard Hochschild, Metrol president, has joined the Budd Co. on a full-time basis. Donald Erdman, a major owner of Metrol, will act as consultant on eddycurrent testina.

Sealed Power Expansion

Work has started on an expansion and modernization program at the Sealed Power Corp. of Canada, Ltd., plant in Stratford, Ont. A. M. Bell, managing director, said that when the addition was completed the plant would have 50,000 sq ft of unobstructed manufacturing area. Included in modernization plans, he said, was an increase in chrome plating capacity by 30 per cent.

Record Goodrich Spending

Capital expenditures of B. F. Goodrich Co. for new and improved facilities this year will approximate \$50 million, a record sum. J. W. Keener, president and chief executive officer, said the concern's present outlook on capital investments calls for an average of \$50 million yearly over the next five years. Mr. Keener said 11 new plants or plant expansions should start producing income this year; another six should become profitable in 1961 and four more before 1964.

ALEMITE BARREL-TO-BEARING LUBRICATION...

> important tool of production!

In today's costly, complex industrial operation, lubrication is more than a simple matter of maintenance! Actually, modern lubrication is an *important production tool* that cuts downtime and boosts production...reduces costs and prolongs machine life!

That's why more and more cost-conscious plant men are taking a long look at lubrication methods. The result-many are switching to years-ahead Alemite Barrel-to-Bearing Lubrication.

A complete Alemite Barrel-to-Bearing Method can be customplanned for your plant. It can include electric, air or hand-operated equipment . . . everything required for high-pressure lubrication, filling hydraulic systems, servicing oil reservoirs, lubricating gear housings, and refilling grease guns.

Let an Alemite expert show you how to get greater production at lower cost with modern, custom-planned lubrication—your important production tool!

Write for free Alemite catalog today!



MACHINERY NEWS

Landis Tool Co.—announces the purchase of Gendron Freres, S. A., reputed to be the largest maker of precision grinding machines in France. Located at Lyon in southeastern France, Gendron Freres currently employs about 850 people. Name of the French company is being changed to Landis Gendron, S. A. Through the Gendron acquisition, Landis has now obtained manu-

facturing facilities in the European Common Market. It is the second overseas acquisition by Landis in the past two years. In 1958 the company acquired Landis Lund Ltd., located at Cross Hills near Keighley, in the northern part of England.

Baird Machine Co.—has adopted a new marketing setup for the Barrel Finishing Equipment Div. that will completely reorganize its long-established dealer sales organization. Plans call for the appointment of 21 major distributors to the metal-finishing field, located in key marketing centers.

Ex-Cell-O Corp.—Optical Gaging Products, Inc., a subsidiary of the corporation, has opened a West Coast Branch at 12200 S. Bellflower Blvd., Downey, Calif., to manufacture chart gages and offer engineering services in the field of optical gaging. Bryant Computer Products has become a Division of Ex-Cell-O. Management, sales, product engineering, and R&D activities of the new division have moved to the Ex-Cell-O Technical Center at Walled Lake, Mich. Manufacture of magnetic storage drums and associated products for computers and guidance systems will continue in Springfield, Vt.

Lapointe Machine Co.—James W. Dopp has been appointed vice-president. He will continue to serve as sales manager of this U. S. representative for a number of British manufacturers of machine tools.

Norton Co.—Andrew B. Holmstrom has retired as vice-president after 41 years of service with the company. Walter J. Bissinger has been appointed sales promotion engineer for gear tooth induction hardening equipment in the Gould & Eberhardt Div.

American Tool Works Co.—William L. McGrath, chairman of the board of The Williamson Co., Cincinnati, has been elected to the board of directors of The American Tool Works Co.

Gisholt Machine Co. — Woodbridge Bissell, production manager, has retired after 30 years of service with the company. John C. Weston is new production manager.

Union Carbide Studies Refractory Alloys

Union Carbide Metals Co. is undertaking a study of refractory metals to develop a columbium-tungsten-tantalum alloy applicable at temperatures up to 3500 F.

The program, in co-operation with the Air Force, will be carried out in three phases covering the effect of interstitials, strengthening mechanisms, and oxidation characteristics.



Tougher... Lighter... Smaller

handles more air...with minimum pressure drop

- and gives you all these other advantages -

Has fewer parts. Locking ring provides positive lock...tight fit ...minimum wear. Equipped with automatic sleeve lock.

Handles any job in your shop using %" to %" connections—from the air line to the air tool.

All Series 2-RL Sockets and Plugs are interchangeable – likewise all Series 3-RL Sockets and Plugs. Eliminates any need for various size couplings in hook-up – makes it easy to keep stock parts in balance – holds inventories to a minimum.





Instant Automatic Flow or Shut-Off

Write for the Hansen Catalog

Here's an always ready reference when you want information on couplings in a hurry. Lists complete range of sizes of Hansen One-Way Shut-Off, Two-Way Shut-Off, and Straight-Through Couplings for LP-Gas, Steam, Oxygen, Acetylene, etc.

Representatives in Principal Cities - See Yellow Pages

HE HANSEN

QUICK-CONNECTIVE FLUID LINE COUPLINGS

MANUFACTURING COMPANY

1031 WEST 150th STREET .

CLEVELAND 35. OHIO

BIGNEWS

in O.D. production grinding...

You Can Now Get Norton Grinders With

HIGHER WHEEL SPEED

SEE THEM AT THE SHOW

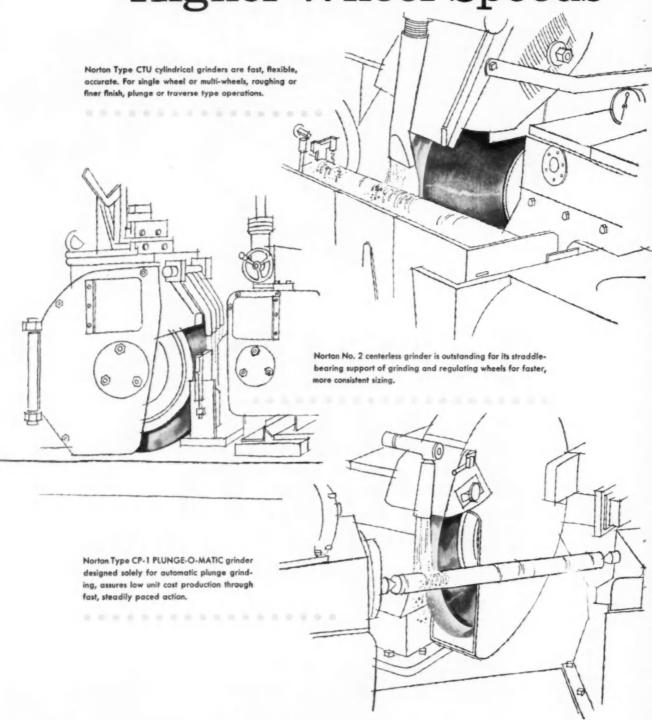
Watch Norton Grinders Running at 8500 SFPM!

Learn how their greatly stepped-up speed brings you new production benefits...



Booth No. 651. At the 1960 NMTBA Show

Higher Wheel Speeds



NORTON PRODUCTS: Abrazires . Grinding Wheels . Machine Tools . Refractories . Electro-Chemicals ... BEHR-MANNING DIVISION: Coated Abrazires . Sharpening Stones . Pressure-Sensitive Tapes

to Speed Production

Norton grinders with

Norton grinding wheels at 8500 SFPM

grind faster and better, with more

savings than ever before.

Norton comes up with this latest advancement only after exhaustive testing of Norton machines and Norton wheels at the new higher speeds.

In test after test Norton machine-wheel teams proved their ability to grind at 8500 SFPM — not only with safety, but with more advantages than were ever obtained under the previous limitation of 6500 SFPM.

That's why important Norton cylindrical production grinders — Type CTU, plus the No. 2 Centerless, plus Type CP-1 PLUNGE-O-MATIC®— are now available with wheel speed ranges stepped up to 8500 SFPM.

New Norton High-Speed Production Benefits

Higher Productivity. Increasing SFPM by 30% reduces grinding time by about one-third and increases pieces-per-hour.

Finer Surface Finish. On most cylindrical jobs, the new higher wheel speed means a finer finish. On Norton machines this advantage is now available to you.

Longer Wheel Life. 8500 SFPM cuts down number of wheel dressings needed thereby increasing the production life of the wheel.

Lower Wheel Cost. Longer wheel life means more pieces-per-wheel, longer wheel use per dollar and thus lower operating cost per wheel.

From now on Norton grinders arranged for the new maximum of 8500 SFPM will be so identified by an attached plate. Norton grinding wheels of the types approved and specially tested for the higher operating speed will also be identified to show this approval. For details on how Norton wheels and machines can bring the new high speed advantages to your production—fast!—call your Norton Man, a trained Grinding Engineer. Or write to Norton Company, Machine Tool Division, Worcester 6, Mass. District Offices: Worcester, Hartford, Cleveland, Chicago, Detroit. In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5.



75 years of . . .

Making better products... to make your products better THE



ON EVERY

CHANDLER

CAP SCREW

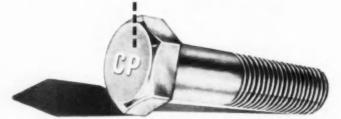
IS YOUR

GUARANTEE OF

QUALITY

UNIFORMITY AND

PRECISION!



This trademark - CP - is your assurance of engineered quality from start to finish . . . your guarantee of functional dependability ... your security that every cap screw has successfully met rigorous performance tests. Chandler Products . . . manufacturers of standard and special fasteners for over 30 years . . . mass-produces cold-headed cap screws from high carbon, alloy, super-alloy and stainless steels. Check with Chandler before placing your next order.



for your copy of CHANDLER PRECISION **FASTENERS**

chandle

products corporation

1492 CHARDON ROAD, CLEVELAND 17, OHIO

Circle 159 on Inquiry Card for more data

America's Future

(Continued from page 70)

In another direction, it was reported from reliable sources that another large automotive manufacturer has arranged through its manufacturing research department, to provide a report and review for all top executives of the technical advances in metalworking manufacturing seen at the Machine Tool Exposition-1960. At this event, all officers of the company who are responsible for authorizing expenditures of more than \$100,000 per item will attend and receive a complete graphic, visual and audio briefing of the total requirements of their company for machine tool modernization.

But an even more important aspect will become evident at the Exposition. Between expositions, thousands of machine tool executives and engineers work closely with thousands of automotive engineers and executives on vital and important projects and plans for improvement of production and increases of productivity. But even with such close contacts, there may be many opportunities for communications which are missed because of regular work and travel schedules and the pressure of daily duties. At the Exposition both the machine tool specialists and the automotive industry specialists will be able to meet for sufficient time to compact into a few days, the exchanges of ideas and development of facts which would otherwise take possibly months of travel and in-plant contacts. The National Machine Tool Builders Association welcomes automotive engineers and executives to its Exposition of 1960 with confidence that every hour of a visit by each person attending the Exposition will produce results in practical values which will have permanent benefits for the Automotive Industries and in turn, greatly enhance the cooperation of the Machine Tool Industry with the production and engineering plans of all visitors. The Exposition is, indeed, a most significant link of cooperation in manufacturing progress toward better quality, lower costs, better profits and advancement in production management generally.

8326-CH



K-S AUTOMOTIVE DEVICES

Telegages Instrument Panels Speedemeters Governors Signals Auto Clocks



Forty years of King-Seeley specialization in the field of automotive instrumentation and control equipment has created a wealth of engineering data and design ideas which, within its scope, is unsurpassed.

Versatile production procedures under systematic statistical quality control have been developed to cope with the unpredictable, but not infrequent, changes so characteristic of the dynamic automotive industry. Once a program is begun, full cooperative responsibility for its successful completion is standard practice at King-Seeley.

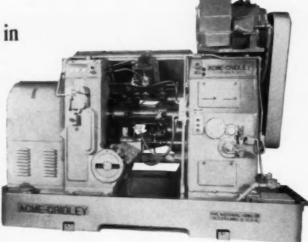
On King-Seeley's executive staff are men nationally recognized as authorities in technology and design. Their contributions to the art are outstanding.

This know-how—this specialized organization exists by serving you.

KING-SEELEY DIVISION

OF THE KING-SEELEY CORPORATION

Major breakthrough in shaft production . . .



Acme-Gridley multiple-spindle shaft machine equals output of four automated lathes

At Chrysler Corporation's Trenton, Michigan, Engine Plant, a remarkable new National Acme shaft turning machine has slashed camshaft production costs; is hailed as a major production development for the entire industry. Performing complete shaft journal machining in a single set-up, this rugged 6-spindle automatic provides substantial savings in floor space and capital outlay, reduces scrap loss and enables closer control of machining operations. Key to this dramatic pay-off are imaginative National Acme solutions to the difficult problems of centering, driving, and stabilizing the long, flexible shaft during turning operations. An ingenious part-holding technique exposes bearing journals for turning—an impossibility in a chucking set-up.

Extreme capability is stressed in the design of the Universal Multiple-Spindle Shaft Turning Machine and permits the maximum number of machining operations to be performed on straight or flanged shafts held between centers.

The shaft turning machine is additional evidence of National Acme know-how applied to the solution of special machining problems. This same insight and ability is available to any manufacturer interested in reduced costs and increased production. Our representative is as close as your telephone.

National Acme's "Zone of Responsibility" includes all phases of cost reduction. Check YOURS . . . Then Check National Acme

Direct Costs: these include direct dollar savings as realized by Chrysler Corporation . . . an "everyday" job for Acme-Gridleys. Indirect Costs: effecting important savings in maintenance, downtime, scrap reduction, tool costs, etc. Product Redesign: teaming with your design group to take full advantage of Acme-Gridleys' cost reducing capabilities. Direct Material Costs: our engineers provide important savings in this area by constantly matching machines and tools to modern metallurgical problems. Make-or-Bay Reviews: in many cases our Contract Division can assume your production headaches and relieve you of immediate capital investment. Spot Modernization: pioneering in modern tooling methods, and the flexibility of Acme-Gridleys can provide many "on-the-spot" savings.



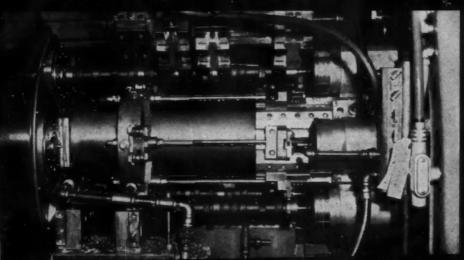
National
Acme The National
Acme Company



Sales Offices, Newson 2 M L. Chicago 6 III. Debait 27 Mich

Circle 161 on Inquiry Card for more data

High-test cast iron camshaft with journal machining completed . . . 13 operations in 22 seconds.



Close-up of tooling zone. Open spindle in load and unload position shows unique centering, holding and driving mechanism.

AIRBRIEFS

By R. RAYMOND KAY

PACIFIC COAST EDITOR

You can't pick up an aviation trade magazine without reading about the profound changes in the aerospace industry.

Today, planemakers are turning

out limited quantities of a few models. Another good indicator of the changed character of the industry is its floor space needs.

Plant Space Requirements

The Air Force recently finished a survey. In 1957 the industry used 60 million sq ft of plant floor space. Today, it needs only 30 million sq ft. Half of this won't be in use within three years, USAF estimates.

Reason: Producing manned aircraft required large manufacturing and assembly areas. This country turned out 5600 units in 1957. This year only 2200 aircraft are scheduled.

There's irony in all this surplus space. The aerospace industry to-day needs new facilities—especially for research and development. The old plants can't be economically adapted to missile making.

The industry is paying a good share of the cost of new plants. From 1955 to 1959, it ploughed in \$1.8 billion. Right now it's committed to invest another \$1 billion in the next five years.

Missile Contracts to Small Firms

Small business is getting a bigger slice of the intercontinental ballistic missile programming. Last year, one prime contractor let out over \$25 million in subcontracts to small firms.

That was 45 per cent of all subcontracting on the project. This year it's up. During the first three months small business firms got 55 per cent of all subcontract money. Over 5000 subcontractors are in this one ICBM program.

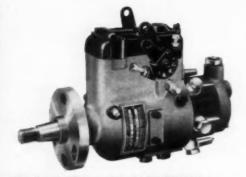
Tip: Prime contractors say that the small firm, with specialized items and know-how, has the best chance of getting business.

Space Research

About \$900 million is going into space research in fiscal 1961.
(Turn to page 150, please)

A few accessories that add versatility:

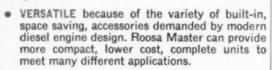




MOST Versatile

FUEL INJECTION PUMP

Diesel engine manufacturers, their designers and engineers are specifying ROOSA MASTER because they know that it is the most versatile. There are many reasons for selecting this pump. Here are just a few:



- VERSATILE because only one size pump serves either a 2, 3, 4, 6, or 8 cylinder, 2 or 4 cycle, small or large displacement engine . . . and only Roosa Master can be mounted vertically or horizontally.
- VERSATILE because it is applicable to automotive, construction, farm, generator, marine and stationary equipment guaranteeing dependable, economical service. Write for further information.

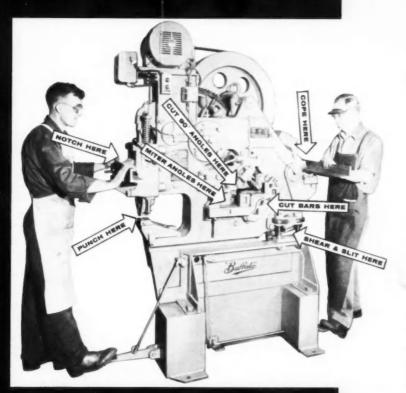




makes good diesels better

HARTFORD MACHINE SCREW CO., HARTFORD 2, CONN.
DIVISION OF STANDARD SCREW COMPANY





QUALITY-BUILT 'BUFFALO' MACHINE TOOLS

See Them at the Machine Tool Exposition - 1960

BOOTH 551

SEVEN OPERATIONS - SAME MACHINE

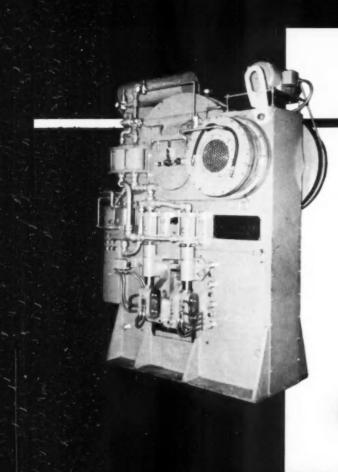
A 'Buffalo' Universal Iron Worker will speed your production and maintenance jobs — cut costs — turn losses into profits.

It can do all the jobs shown — several at the same time — many without changing tools.

This versatile, space-saving machine is quality-built to assure long life with minimum maintenance.

It is available in models and sizes to suit your needs. Thousands of users call the 'BUFFALO' U. I. W. the most useful machine in their shops. Perhaps you will, too. See it in action at the Machine Tool Exposition. If you're in a hurry for full details, contact your machine tool dealer — or write

direct for Bulletin 322.



NEW FOR THE — MACHINE TOOL EXPOSITION-1960

NEW 'BUFFALO' 400 BILLET SHEAR

For high speed production billet cutting. Continuous operation at full capacity (within its rating) on any shearable material. Handles mild steel squares to 4", rounds to 4½". Speeds up to 60 strokes per minute. Ram tonnage: 400 tons. Machine stroke: 2". Quick, easy knife changing—both knives are removable from rear. Potential of 18,000 cuts per 8 hr. shift on automatic basis. Welded alloy steel frame has guaranteed minimum strength of 65,000 psi. Push button or foot-operated electrical control. Positive pneumatic oiling system.

The new 'Buffalo' 400 Billet Shear in operation will be one of the most exciting exhibits at the Machine Tool Exposition. See it there... write direct for complete facts... or call your machine tool dealer.



BUFFALO FORGE

Canadian Blower & Forge

DRILLING

PUNCHING

SEE THEM IN OPERATION...BOOTH 551

NEW 'BUFFALO' HOLLOW SPINDLE DRILLING MACHINES

Now you can handle formerly "impossible" drilling jobs at production speeds. Successfully drill super-hard titanium, stellite, rene 41, stainless and other exotic metals — quickly and cleanly with the incomparable 'Buffalo' Hollow Spindle RPMster and #18 drilling machines. Coolant flow through spindle, instant speed changes and extra-rugged construction let you realize full potential of hollow "Cold-Point" drills and diamond core bits.

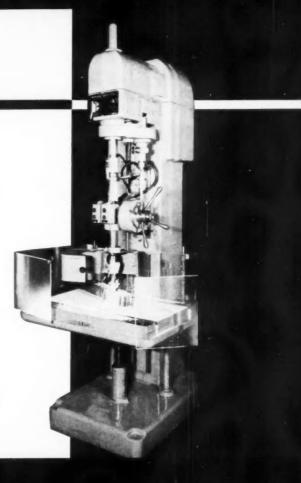
The results are amazing. Productivity increases range to more than 300% in actual production runs. See the new 'Buffalo' Hollow Spindle machines drilling exotic metals and ceramics at the Machine Tool Exposition. We will test-drill a sample of your hard-to-drill metals. Just bring it to the show.

Details available on request.

COMPANY 490 Broadway • Buffalo, N. Y.

Co., Ltd., Kitchener, Ont.

SHEARING . BENDING





These efficient, sturdily-built machines will cut costs and increase output in your production bending operations. Quick roll changes speed bending of almost every structural shape and size into circles, segments or spirals. Production time can be further reduced up to 30% by hydraulic adjustment on upper roll (optional). Leg-in bending and other specialized jobs are easily handled by

special rolls. Choose from horizontal or vertical models in a wide range of capacities. Quality construction assures long life.

See demonstration of 'Buffalo' Bending Rolls at the Machine Tool Exposition. You can also call in your nearby machine tool dealer, or write us direct for Bulletin 352.

See 'BUFFALO' machine tools in action at the Machine Tool Exposition, 1960... BOOTH 551





THOMSON RIVETS offer faster assembly . . . greater strength . . . improved performance

Cost-and-method analyses prove that rivets, teamed with automatic rivet-setting machines, cut costs, speed assembly, provide more dependable fastening. That's why auto makers and their suppliers specify rivets on over 500 assembly points on today's models.

75 years' experience in solving fastening problems is the plus you get when J. L. Thomson Mfg. Co. becomes your source of rivets and machines. With over 8000 rivet specifications and more than 200 rivet setting machine models, Thomson is your authoritative source for fastening help.



Write for "Cost Cutting Facts About Fastening With Rivets", a new, complete digest of up-to-date information on rivets and automatic machines. The coupon at right, attached to your company's letterhead, will bring it to you quickly. For more immediate problems, get in touch with your nearby Thomson Fastening Man. He's listed in the Yellow Pages.

Thomson Rivets cut costs for such products as BRAKES, CLUTCHES, DISTRIBUTORS, SWITCHES, RADIOS, CARBURETORS, WINDOW LIFTS, BODY ASSEMBLIES,

and hundreds of other automotive fastening jobs from radiator grills to gas tank caps.



Judson L. Thomson Mfg. Co., 930 Sawyer Rd., Waltham, Mass.

Name	Title
Сотрану	
Address	

NEW YORK . ILLINOIS . INDIANA . OHIO . MICH. . PENN. . CALIF. . FLA. . TEXAS . S. CAROLINA . MISSOURI

WHY

MICROHONING*

of Accumulator Bores provides processing short cut

American Bosch Division of American Bosch Arma Corporation has recently added hydraulic cranking systems and a wide variety of hydraulic accumulators to their extensive line of precision equipment. Microhoning is specified as the only machining operation performed in the bores of the accumulator housings—here is why.



This horizontal Hydrohoner has a hydraulically reciprocated carriage, a ten-foot stroke and a four-speed transmission.

PROCESSING

The accumulator housings are made from mill stock tubing that is mostly either cold rolled welded or cold drawn seamless steel (some of the 4.750" I.D. tubing is aluminum alloy). Economical processing of tube bores is realized through the inherent efficiency of Microhoning in generating geometry, size and surface finish. Microhoning is the only machining done on bores ranging in diameter from 3.000" to 6.180" and in lengths from 6.375" to 123".

RAPID STOCK REMOVAL

Accumulator bores are rough—and finished—Microhoned on the horizontal Hydrohoner shown. It is designed to provide rapid stock removal and generate accuracy in long bores. Rough-Microhoning of the mill stock tubing bores removes up to .040" of stock at a rate of better than .001" per minute. Finish-Microhoning removes .004" of stock while generating final accuracies and specified surface finishes.

FUNCTIONAL BORES

In addition to consistent bores that are well within specified size and geometry tolerances, Microhoning provides controlled surface finishes of 7-8 microinches, rms. The Microhoned surfaces are so consistent that a check on a precision surface analyzer is made only two or three times per eight-hour shift. Microhoned bores assure smoother operation and longer life for piston seals in assembled accumulators. *Registered U. S. Pat. Off.

Visit Us In Booth 1225 - The Machine Tool Exposition



MICROMATIC HONE CORP.

AIRBRIEFS

(Continued from page 144)

That's double the amount for research and development of military aircraft and related equipment.

Some of the space research money will buy a small amount of hardware. The aircraft fund is all for research and development.

Airlines Carry 47% of Passengers

Airlines lead all common carriers in the nation's inter-city passenger traffic. Latest figures show they account for 47 per cent. That compares with railroads, 28 per cent; buses, 24 per cent.

Times certainly have changed. Ten years ago the airline passenger-mile share was 14 per cent and the railroads led with 48 per cent.

An aerospace company is making big savings. How? It's adapted a program of mechanized production control by integrating all electronic data processing in one complete cycle.

Heart of the program is a master computer. Along with other data processing equipment, it gives management the daily status of every project.

There's a new Aeronautical Dictionary, compiled by National Aeronautics and Space Administration. The 199-page volume lists 4000 aeronautical terms. It includes space technology terms and aeronautical applications.

The dictionary is for sale for \$1.75 from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

* * *

BRIEF AIRBRIEFS . . . The aerospace industry pays out about \$5.2 billion a year to its workers. . . . Ten years ago, the ratio of engineers to production workers was 1 to 11. Today it's 1 to 4.

Aerojet-General Corp. reports it has successfully tested some solid fuel rocket motors for the Polaris. These are more powerful than the ones used recently in submarine launch from Cape Canaveral, Fla.

• NEWS FEATURES

(Continued from page 51)

Enjay Splits Division

Enjay Chemical Co., a division of Humble Oil & Refining Co., has split its Chemical Div. into two new product divisions—Industrial Chemicals and Chemical Raw Materials. R. K. Dix, vice-president and head of the Products Management Dept., said the change was made necessary by "the increasing complexity of Enjay's chemicals business and the large number and volume of chemicals that are currently handled by the Chemicals Division."

New Intercity Bus Developed by GMC

A new 41-passenger intercity coach powered by a V-8 Diesel engine and featuring numerous mechanical and styling improvements has been developed by GMC Truck & Coach Div. Production is scheduled to start Jan. 1 with deliveries due in the second quarter of 1961.

Calvin J. Werner, division general manager, said the engine of the newest bus, the PD-4106, has the ability to deliver high torque at low speeds (770 lb ft at 1200 rpm) and can use an "overdrive" gear ratio.

Other improvements include a lower roof line, relocated lights, more passenger window area, dual headlights, enlarged baggage space and a new air conditioning system with 20 per cent more output.

Blue Heads Association

Roy E. Blue, chief product engineer of the Amplex Div., Chrysler Corp., has been elected president of the Powder Metallurgy Institute.

Bolton Elected

Smith Bolton has been elected president of the Powder Metallurgy Parts Manufacturers Association. He is divisional president and general manager, U. S. Graphite Co., a division of Wickes Corp.

(Turn to page 164, please)

of Accumulator Bores provides processing short cut

Fast, economical generating of specified bore size, geometry and surface finish in accumulator housings is required by American Bosch Division of American Bosch Arma Corporation. Housings are made from mill stock tubing and Microhoning is specified as the most suitable process to consistently and quickly generate precision bores. Here is how a horizontal Hydrohoner provides a processing short cut.



The flange-type tool used to Microhone the 6.180" I.D. tubing has 8" long stones and four fibre guides. These stationary guides pilot the tool into the bore and prevent "collapsed" abrasives from marking precision bore surfaces when withdrawing the tool.

SIMPLIFIED PROCESSING

Because Microhoning characteristics include: rapid stock removal; consistent machining to specified size; correction of geometric irregularities; and generation of microinch finishes, there is no need for any other machining operation. Rough-Microhoning of the bores removes up to .040" stock at a rate better than .001" per minute. Then the finish-Microhoning operation quickly generates final size, geometry and surface finish. Thus, processing is simple, quick and economical.

AUTOMATIC GAGING

Gage Air Microsize is used to automatically terminate the Microhoning cycle as each bore reaches specified size. Microsize controls are interlocked with Hydrohoner controls, and the reciprocating gage spindle is synchronized with the tool spindle. Therefore, at each withdraw stroke of the tool, the gage spindle attempts to enter the bore. When it enters the bore, the air backpressure is increased and at a predetermined back-pressure the Hydrohoner is automatically stopped.

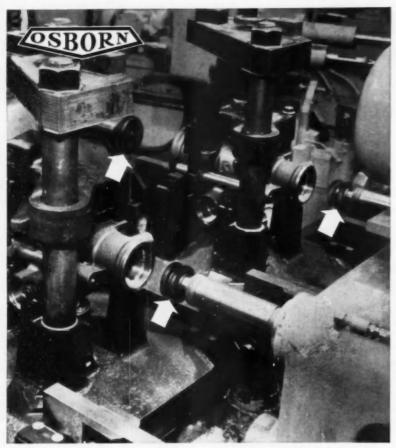
HIGH EFFICIENCY

Another factor contributing to the high efficiency of this Microhoning set-up is the electric rotary feed tool. This design provides constant feed speed and maximum cutting action. Also, with rapid expansion and "collapse" of abrasives, it assures shorter cycle time than obtainable with conventional hydraulic feed mechanisms.

Visit Us In Booth 1225 - The Machine Tool Exposition



MICROMATIC HONE CORP.



In this automatic twin setup, Osborn TY® brushes are advanced into both ends of a pair of valve housings without surface contact. The drive head oscillates the brushes around the ring groove contours, then retracts . . . all automatically.

HIDDEN BURRS knocked off

in 51/2 seconds with new OSBORN TY Power Brushes

This large manufacturer of automotive power steering equipment uses Osborn TY* brushes to deburr double internal ring grooves in both ends of these valve housings. Former off-hand methods required lots of time . . . effort. Still, high quality standards were hard to obtain.

Today deburring is done automatically with Osborn TY brushes . . . in just 5½ seconds. High quality results are uniform . . . consistent. These tough, durable TY brushes operate 16 hours a day in a 96-station automatic transfer machine. Even in this rugged service, brush life runs 2½ to 3½ weeks.

An Osborn Brushing Analysis—made in your plant now at no cost or obligation—is the first step toward improving your metal finishing operations of every description—deburring, cleaning, polishing, precision blending. Write or phone for details. The Osborn Manufacturing Company, Dept. E-92, Cleveland 14, Ohio. Phone ENdicott 1-1900.



Osborn Brusher

OSBORN BOOTH 375-377

Metal Finishing Machines . . . and Finishing Methods

Metal Finishing Machines . . . and Finishing Methods

Power, Paint and Maintenance Brushes • Foundry Production Machinery

METALS

(Continued from page 132)

its pot lines to reduce inventories. At the end of the half year aluminum inventories held by producers had risen to this highest level since March, 1959. In consequence, it may be doubtful if the producers will continue to operate at 85 per cent capacity as they have been doing. First half production of primary aluminum totalled slightly over 1 million tons, up about 15 per cent above the volume for the first half of 1959. But the second quarter was definitely disappointing. Export trade was lower. It was always debatable whether the big exports in the first quarter represented true consumption or stocking up metals for newly acquired subsidiaries.

Recovery Expected In Fourth Quarter

Like steel, aluminum looks to the fourth quarter for a recovery. Warehouses are not over optimistic however. They see volume in 1960 no more than in 1959, with sales of no more than 200,000 tons. This is the second time this year estimates of probable 1960 business have been down graded by the distributors. A rise of 12 per cent in sheet and plate shipments in the second quarter was cheering. This resulted from great interest in building sheet through introduction of a low-priced line for mass production. Sheet and plate business represents about 70 per cent of warehouse sales.

Highly indicative of the general slump in the aluminum industry has been the decline in second quarter profits for the producers. For example, Alcoa reported profits off 27 per cent from the first quarter, and Kaiser was off 50 per cent.

New Developments

An interesting new development has been announced by Aluminium Ltd. to build an experimental plant that will refine metal direct from bauxite. The major saving will be in investment cost. If the pilot plant process proves successful, future aluminum plants would be able



One in a series of technical discussions on Tachometers.

What IS the "Inside Story" on Electric Tachometers?

It may be profitable for you to know why Sun electric Tachometers are the overwhelming preference for original or optional equipment by car and truck manufacturers, and engine builders.

The reason for this choice is the "inside story" of electric Tachometers.

Engineers know the prime requisite of a Tachometer is to supply ACCURATE measurement of engine RPM under all operating conditions. And for this reason, the electric type, such as Sun manufactures, is best suited for internal combustion engine applications.

Electric Type is Smoother

They have found through laboratory tests and field experience that an electric type gives smoother, steadier, more accurate readings—and is less subject to needle waver. It is not affected as much by bumps, waves or washboard roads.

Source of power is a Transmitter (sending unit). The Sun unit is housed in a heavy black Bakelite Case for perfect insulation, sealed against dust and moisture. It requires no special drive



mechanism. There is only one moving part, a high-speed Relay Switch with solid silver contacts which will never wear out.

This system does not take current from the vehicle's battery and cannot injure ignition points or any part of the electrical system. Easily replaceable Mercury Cell batteries supply the small amount of current required to operate the Tachometer Head.

Sun Features "Ruggedized Accuracy"

One of the reasons for the preference of Sun Tachometers is that engineers

have found that the use of a rugged D'Arsonval Movement, with jewels mounted in silicone rubber, re-



duces shock or vibrations. This is a Sun manufacturing exclusive, and is called "Ruggedized Accuracy."

It affords longer Tachometer life and greater accuracy. Beryllium hair-springs minimize spring fatigue.

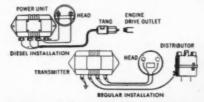
Adding to this tough, "Ruggedized" story, is the use of Alnico magnets, for permanent strength—and double bridge construction.



Torture-tested components, with threephase quality control and inspection, assure top Tachometer field performances at all times.

Easy to Install— Even on Diesels

Unlike other models, tests have shown that there is no installation problem with a Sun electric Tachometer. Even Diesel applications are simple and foolproof. For Diesels, Sun Power Units are available for standard S. A. E. drive ratios—and S. A. E. mechanical drive outlets. Troublesome, long drive shafts are eliminated.



The Sun Transmitter Unit attaches to any S.A.E. mechanical drive outlet where electrical impulses are picked up and transmitted to the Power Unit, then relayed to the Tachometer head in terms of RPM.

Wide Applications

Sun Tachometers are in demand for Gasoline, Diesel, Marine, Stationary engines, as well as Off-the-road equipment applications. Their use cuts engine strain, helps stop harmful engine overspeeding. This leads to longer engine life.

Adjustable arrows are another liked Sun feature. Mounted under glass, they can be locked at any point to show an operating range to help the driver maintain safe, economical engine RPM.



Drivers say the larger Sun numerals are easier to read, and cut fatigue. And indirect lighting assures good night time visibility.

Samples Available

Why not look deeper into the "inside story" of Sun electric Tachometers, and see if there's an application they can fit for you?

Samples are available immediately for engineering tests, along with reference catalog bulletins and print specifications. Just fill in the coupon below for immediate action. Thank you.

AVAILABLE FOR ORIGINAL EQUIPMENT OR REPLACEMENT SULL ruggedized ACCURACY	Sun Electric Corporation Tachometer Division 6373 N. Avondale Avenue Chicago 31, Illinois I'm interested in the Sun Electric Tachometer story! Send me details on Sample Tachometer for engineering analysis. Send me catalogs and print specifications. Name
ELECTRIC TACHOMETERS Makers of Electric Tachometers for Automotive, Marine and Stationary Engines; both Gasoline and Diesel.	FirmZoneState

to ship the alumina stage of the conventional process. It is expected the new facilities will be in operation within two years. The company is investing \$4 million to try it out.

A major breakthrough in the can markets has been caused by the announcement of the full scale use of aluminum in cans for citrus concentrate used by Minute Maid Corp. Beginning with the 1960-61 pack all standard 6-oz cans, totalling 50 million, will be made of aluminum. A substantial saving in freight

costs is anticipated as a result of the substitution for conventional tin plate in the manufacture.

Copper Demand Slow in U. S. But Strong Abroad

There is reason to think that the producers' 33 cents a pound price for copper would have been reduced before now if it had not been for disturbances in the Congo with a threat to continued operation of

Katanga, source of about 10 per cent of the world's copper. Coupled with that was possibility that Rhodesian output might be affected. and uncertainty over labor negotiations in the principal Chile copper mine. In consequence, European fabricators who are largely dependent on Chilean and African copper have been buying heavily and probably adding metal to their inventories. The situation has been different in this country where there has been conspicuous lack of strong buying. Domestic mine production has been sufficient, and more so, to provide for domestic consumption. This was indicated by the rise in domestic stocks of copper to a new high of over 91,-000 tons at the end of July.

Brass Sales Expected To Improve

Business with the brass mills continues dull, but manufacturers predict a modest rise over the next few months. September will be the first full month that has not been interrupted by vacation closings. Imports continue to plague the industry, but the rate is tapering off. During the first half of the year imports totalled about 93 million pounds. This is less than in the same period of 1959.

Price Stays Firm

The relative stability of the U.S. price of copper which has held at 33¢ for nine months without change, a most unusual record, is a good augury that the price may hold for the rest of the year. Confirming this belief is the extraordinary firmness of the London futures price, which has been steady around 301/2¢ a pound, while the spot price has declined. In short, backwardation, or the premium of spot over futures, has virtually disappeared. It has been as much as 21/2 é a pound only a few months ago. The conclusion seems justified that London metal traders do not expect to see a decline in the metal over the next 90 days.

Zinc Sales Improve

Zinc sales picked up substantially early in August, following a dull July. Most zinc sellers declare that





They repel water, stop rust, reduce friction, resist abrasion, stand 300° F. heat or -65° F. cold. Hard or soft, their wondrous interlocking fibers go on flexing, filtering, wicking or wiping long after other materials break down.

For big products and small, Western Felt has specialists in coated and impregnated felts ready to assist you.



Write for our free sample brochure of Treated Felts.

WESTERN

Logica Ave. Chicago 23

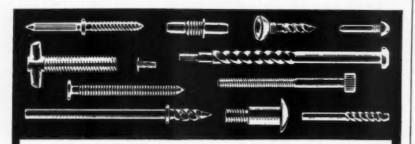
Branches in Principal Cities



MANUFACTURERS AND CUTTERS OF WOOL FELTS AND SYNTHETIC RUBBER

DISCERNING DRAFTSMEN THE WORLD OVER DEMAND IMPERIAL THE WORLD'S FINEST TRACING CLOTH

Circle 171 on Inquiry Card for more data



Job-Designed Threaded Parts for Every Industry



Here is a fast, dependable, low cost, quality minded source of supply for JOB-DESIGNED threaded parts and fasteners of all types, in any metal, to fit your own particular assembly

problem. Recognize the fact that a fastener designed specifically to fill a seemingly complex assembly requirement can easily cost less than design modification to accommodate so-called standard rivets. Assembly costs are a very major part of manufacturing expense. Most of this is labor. The fastening medium itself is usually a minimum item. If a Job-Designed fastener makes assembly simpler and faster, permits the use of fewer fasteners,

allows the designer functional freedom and improves product efficiency, yours is a specifying job well done. All these possibilities are available when you come to blassall for design assistance and quotation on challenging, difficult or unusual rivets, threaded nails, drive screws and other cold headed parts. Short or lông runs, pilot quantities, engineering counsel, over 100 years of Intimate association with cold heading—and a deep appreciation and regard for the concept of value analysis—all are a part of the Hassall service to you.

Send for a copy of our latest catalog.

JOHN HASSALL, INC. MANUFACTURERS SINCE 1850 P. O. Box 2194 · Westbury, Long Island, N.Y. the market is firm and the cut in the price premiums on Special High and Regular High grades announced in July was not a sign of weakness for Prime Western. Sales were the highest in early August since the first of the year. The strong demand was not unexpected. Consumers had been living on their inventories for a long time. With the summer let down over, actual consumption was rising. Especially gratifying was the better demand for High Grade zinc.

In spite of the low operating rate for the steel industry, the 13 cent E. St. Louis price is expected to hold. London has been remarkably steady for months although the great demand of a few months ago has tapered off. Use of the galvanizing grade has held up very well in spite of the steel slow up and most continuous galvanizing lines have continued to operate.

July Statistics Unimpressive

Zinc statistics for July might be considered bearish to some degree, as stocks of metal in the hands of producers rose above 207,000 tons, the highest in 21 months. Shipments during the month were up slightly over June but were substantially less than smelter production. Exports increased about 1000 tons. This was in sharp contrast with a year ago when a negligible tonnage went abroad.

The strike at zinc and lead properties in Idaho continues. A new work stoppage loomed in mid-August, when operations at New Jersey Zinc Company's plants were halted by strikes. If long continued, this could have a pronounced effect on domestic zinc suppliers in this country and lead to a stronger market.

Lead Demand Shows Some Gain

Like zinc, demand for lead increased sharply in August and sales reflected the entry into the market of some of the larger consumers since last May. However, there was no sign of a tight situation. With the vacation season over, manufacturers are expected to start taking more metal. The climb in domestic stocks ap-

KNOW YOUR ALLOY STEELS . . .

This is one of a series of advertisements dealing with basic facts about alloy steels. Though much of the information is elementary, we believe it will be of interest to many in this field, including men of broad experience who may find it useful to review fundamentals from time to time.

Thermal Stress-Relieving of Alloy Steels

In the production of alloy steel bars and parts made of alloy steel, stresses are sometimes set up, and these stresses must be relieved before optimum results can be expected. Two general types of stress-relieving are practiced—thermal and mechanical. In this discussion we shall consider only the former.

There are several important reasons for thermal stress-relieving. Among these are the following:

- (1) The first and most fundamental purpose is to reduce residual stresses that might prove harmful in actual service. In the production of quenched and tempered alloy steel bars, machine-straightening is necessary. This induces residual stresses in varying degrees. Bars are usually stress-relieved after the straightening operation. When the bars are subjected to later processing that sets up additional stresses, subsequent stress-relieving may be necessary.
- (2) A second major purpose of thermal stress-relieving is to improve the dimensional stability of parts requiring close tolerances. For example, in rough-machining, residual stresses are sometimes introduced, and these should be relieved if dimensional stability is to be assured during the finish-machining.
- (3) Thermal stress-relieving is also recommended as a means of restoring mechanical properties (especially ductility) after certain types of cold-working. Moreover, it is required by the "safe-welding" grades of alloy steels after a welding operation has been completed.

Alloy bars are commonly stressrelieved in furnaces. Temperatures under the transformation range are employed, and they are usually in the area from 850 deg to 1200 deg F. The amount of time required in the furnace will vary, being influenced by grade of steel, magnitude of residual stresses caused by prior processing, and mass effect of steel being heated. After the bars have been removed from the furnace, they are allowed to cool in still air to room temperature.

In the case of quenched and tempered alloy bars, the stress-relieving temperature should be about 100 deg F less than the tempering temperature. Should the stress-relieving temperature exceed the tempering temperature, the mechanical properties will be altered.

Items other than bars (parts, for example) can be wholly or selectively stress-relieved. If the furnace method is used, the entire piece is of course subjected to the heat; selective relieving is impossible. However, if a liquid salt bath or induction heating is used, the piece can be given overall relief or selective relief, whichever is desired.

Detailed information about stress-relieving is available through Bethlehem's technical staff. And remember that we can furnish the entire range of AISI standard alloy steels, as well as all carbon grades.

This series of alloy steel advertisements is now available as a compact booklet, "Quick Facts about Alloy Steels." If you would like a free copy, please address your request to Publications Department, Bethlehem Steel Company, Bethlehem, Pa.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL



pears to have been halted. This has been ascribed to the work stoppage in the lead mines in the Northwest. However, world stocks of lead are still increasing. While it is possible that lead will sell higher than 12 cents later this year, the outlook is less promising than for zinc. The metal continues to lose ground in some important markets to competitive materials.

White Metal

A recent "White Metal News Letter" (International Nickel Co.) has a few items of interest to our readers. Here they are: Rhodium is often plated over nickel on switch contact components of printed circuits for computers, guidance devices, and advance instrumentation to secure a tarnishfree, long-lived hard surface. Because of its shock-resistance at low temperatures, ductile iron is being employed for components used in Arctic regions. Another item of interest is that a gas turbinedriven truck is being used to haul ore at Inco's open pit mine in Ontario. It is hauling 32 tons up an 8-per cent grade around the walls of the mine. This experience should provide some valuable information as to the utility of the gas turbine powerplant.

Trends in Automotive Industry Uses of Machine Tools

(Continued from page 73)

Another example of similar character is found in modern piston machining. Here again we have a rather complicated sequence of operations, including plating. Yet the entire sequence from start to finish is handled on an integrated line of many different kinds of machines.

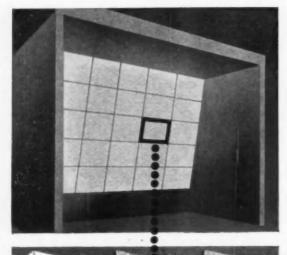
Numerical Control

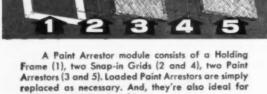
Numerical control has been gaining headway in recent years. Applications in the military aircraft and missile field have been well publicized. The important question is: what economic applications will there be in the automotive field? One aswer to this question is found in two special machines installed during the past year by Detroit Diesel. One of these is a Natco drilling and boring machine of

multiple station type for finishing the starter opening in flywheel housings. Openings are interchangeable on all housings but the location varies all over the map. Numerical control has made it possible to control positioning of the part on the table under each of the heads. Parts are put through in batches, some in relatively small numbers.

The other is a K & T Milwaukee-Matic. Features of this machine are: the indexing tool holder, containing 30 tools; shuttle mechanism for shifting a fixture onto the indexing work table; and two magnetic tapes. The provision of two tapes makes it possible to run two different parts in succession without any interruption of the cycle.

Detroit Diesel has found this





air-borne ink, mist, dye, frit, etc.

CONTROL PAINT OVERSPRAY the inexpensive, effective way!

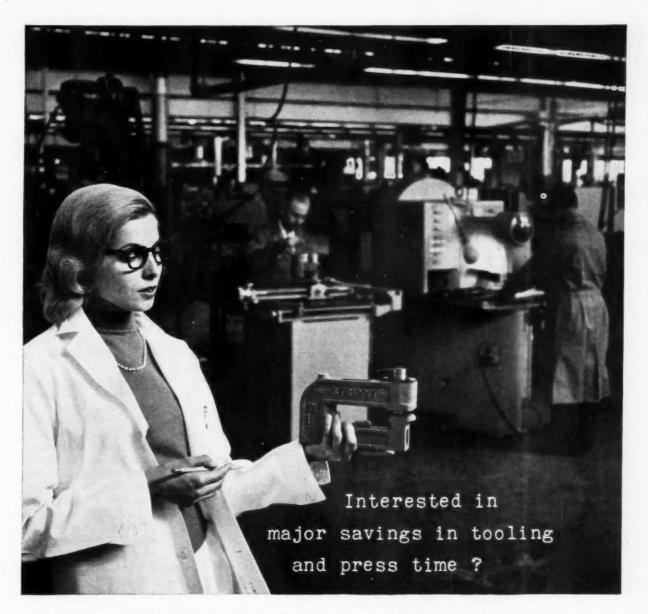
The advantages of R P Paint Arrestors, the inexpensive, disposable air filters are many. Overspray solids are trapped before they reach the exhaust stack... to reduce fire hazards, damage to adjacent property... disagreeable and time-consuming maintenance work. Installation? —easy and fast. Maintenance? —remove loaded Paint Arrestor and replace a new one. Adaptability? —ideal for any type, any size booth, new or existing.

®PAINT ARRESTORS



RESEARCH PRODUCTS Corporation

Dept. 310-I, MADISON I, WISCONSIN



Come to STRIPPIT - Booth 340 at Chicago's Navy Pier

You'll get a fresh slant on ways to work metal when you visit the Production Engineering Show in September. Stop by the STRIPPIT booth and see how our self-contained punching units eliminate expensive dies, how the Flex-O-Drill sharply reduces template making time, how our versatile Fabricators simplify pilot and production runs. SELF-CONTAINED HOLE PUNCHING UNITS reduce tooling to a simple assembly operation. Punches, stripping guides and die buttons are component parts of the unit. Nothing's attached to press ram. No die set required!

STRIPPIT FLEX-O-DRILL (left) speeds production of accurate templates and layouts. A table-top precision machine for drilling, reaming, center punching and scribing, Flex-O-Drill does away with need for base-line drawings or vernier height gauges. Handles ¼" material up to 24" wide and in any length. STRIPPIT MODEL

15A FABRICATOR (right), the latest model of one of industry's most versatile sheet metalworking machines, features the new Strippit Electro-Hydramatic Head for controlling the stroke. The time-saving Fabricator punches any sheet material up to ¼" thick, notches and nibbles up to ½" thick material.

If you can't make the show, be sure to write for the General Catalog explaining the STRIPPIT System.



242 Buell Road Akron, New York

In Canada: Strippit Tool & Machine Company, Brampton, Ontario; In Continental Europe: Raskin, S.A., Lausanne, Switzerland; In the British Isles: E.H. Jones, (Machine Tools) Ltd., Hove, Sussex, England.

Meet the AI By-Liners



A brief biographical sketch of the editors and contributors to Al whose by-lines appear regularly

Introducing

H. H. "Harry" Roberts

A senior editor with more than twenty-five years of association with the Chilton Company, H. H. Roberts has specialized on AUTOMOTIVE INDUSTRIES since 1942. As the managing editor and engineering editor, "Harry" reflects his personality in every editorial page of the magazine, in every issue.

He brought to AI a seldom-equaled wealth of technical and editorial experience which provided him with background for evaluation of virtually every automotive subject. His depth of analysis and evaluation is based upon shop responsibilities which reach back as far as 1910 in machine shop lore, substantially increased by lengthy service in automotive service shops, the Armed Services and eventually, ownership responsibilities in a car agency. A brief career profile includes:

- 1910 —Machinist, magneto and telephone parts.
- 1911 —Foreman, Multigraph factory branch shop.
- 1913-15-His own motorcycle shop.
- 1916-24—Asst. Service Mgr., then Service and Parts Mgr. for a distributor of three makes of cars and one truck. (In Army 18 months of this time. In charge of artillery repairs for 108 Field Artillery, 33rd Div.)
- 1924-31—Service manager for dealer and distributor of two makes of cars.
- 1931-33 (Inclusive)—Co-owner of automobile repair shop.
- 1933-34—Co-owner, new car agency.
- 1935-60—Chilton Company. Automotive Book Department seven years. Automotive Industries 1942 to present, starting as assistant editor.

Among members of the AI staff, "Harry" is regarded as the Dean of the AI Editorial Board. The quality, precision and interest contained in every article are a product, to some degree, of his exceptional skills. machine to be flexible and economic for the machining of service parts and special engine parts that are required in small numbers, usually less than 100 pieces. Success of the operation depends upon proper fixture design as well as the careful selection of intricately machined pieces with holes or pads in at least two planes.

Usually it takes just a few practically applications to point the way to the utilization of a new technique. It would not surprise us to find that Detroit Diesel's experience will encourage further applications in other plants producing industrial engines as well as other mechanism.

We look to the current Machine Tool Exposition and associated activities to pave the way to new levels of manufacturing economy for the near future. Judging by current developments in automotive design we should see an increasing use of aluminum in engines and other parts. The higher cutting speeds and feeds associated with best aluminum chip production are bound to have an effect on the design of machine tools yet unborn. Widespread aluminum machining should bring with it a new wave of equipment buying in the near future.

Gas Turbines

Gas turbine developments should be reaching some conclusions during the next several years. When you stop to think of it, the automotive industry has no plants or equipment specifically suitable for the mass production of this type of powerplant. If it does emerge, even if only for trucks and buses at the start, some one will have to build new plants and equip them with a great deal of special equipment that still remains to be visualized and designed.

One thing is certain, the flux of change will have great influence on the buying of machine tools in the coming years. A revolutionary change such as the gas turbine could very well obsolete much of the equipment now accepted in the manufacture of reciprocating engines. Thus the future holds great promise for the machine tool industry.

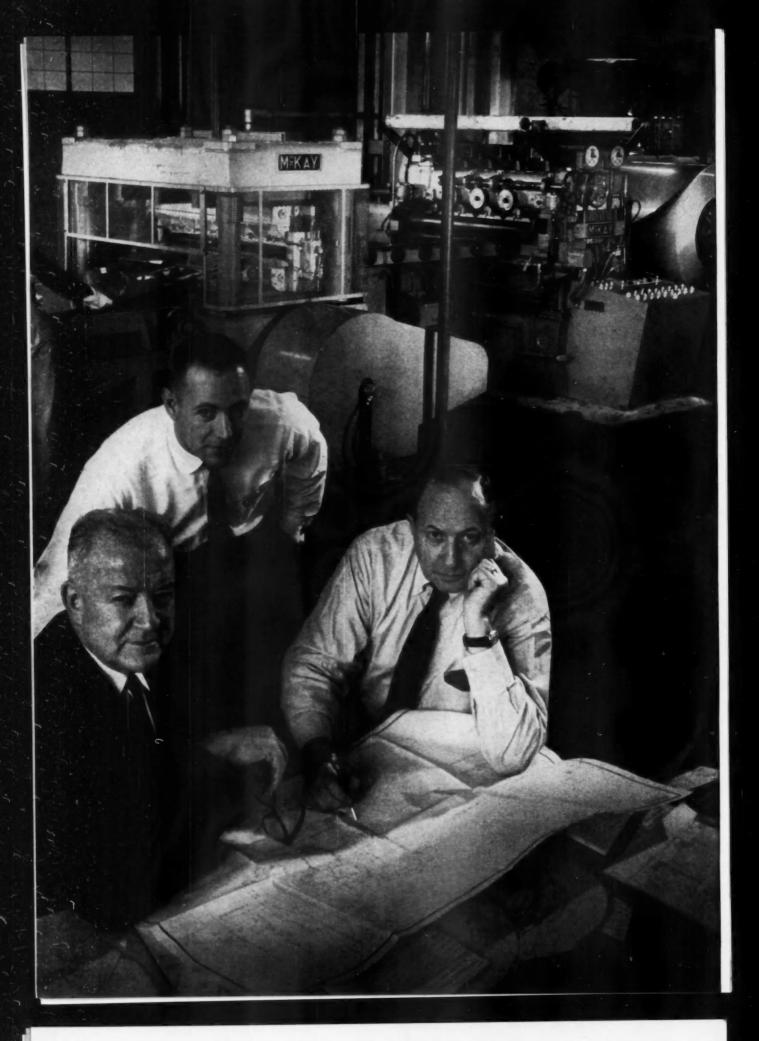
in 1960...

LOOK TO



FOR PROGRESS
IN METAL
PROCESSING

FOR EXAMPLE, the revolutionary new McKaymatic*
Die Shear Line that has reduced costs and cut scrap
losses for many steel makers, warehousers, and fabricators. For the complete story on one of these — Eastern
Stainless Steel Corporation—please turn the page.



Revolutionary
New McKaymatic
Die Shear Line
boosts production
... cuts scrap loss
for Eastern
Stainless!

Photo by Arnold Newman shows (seated left to right) W. F. Schneid, vice president—general manager, and H. J. Verner, chief engineer of Eastern Stainless Steel Corp., discussing cost reductions in stainless steel processing with (standing) McKay Machine sales engineer, Robert D. Lynn, in front of a McKaymatic* Die Shear Line recently installed in Eastern Stainless cold strip department

"We consider the McKaymatic* the finest advancement in shearing to come along in a great many years," says W.F. Schneid, vice president-general manager, of Eastern Stainless Steel Corporation, Baltimore, Md. "We have reduced production time, cut our scrap loss, and have recorded an overall increase in department efficiency as a direct result of this new McKay die shear line," Mr. Schneid continues.

Eastern Stainless is a prime supplier of stainless steel sheets, strip and plates, for aircraft and missile parts, for food, chemical, paper and textile machinery and for architectural uses. It produces 25 grades of stainless steel in its own modern electric furnace facilities, and ships about sixty-six percent of it in sheet form.

Programs many grades instantly—Through improved roller leveler techniques, Eastern Stainless found it was able to instantly program many grades of sheet through its new McKaymatic* Die Shear Line. The line decoils, levels in a 17-roll McKay Roller Leveler, measures by electronics and cuts to length—replacing a cut-up, re-level, and re-square operation prior to boxing. Production of cut lengths has been substantially increased.

The result, they report, is cost savings. Says Mr Schneid: "As a result of our efforts to improve customer service, we installed this line to speed up production of these cut lengths. It has enabled us to break a production bottleneck for which there seemed to be no solution."

Line eliminates stretcher leveling—Mr. Schneid continued that production time has been reduced on sheets of five grades as a result of being able to eliminate stretcher leveling and re-squaring procedures. Also, he said, the scrap loss on re-squaring has been eliminated as the sheets are cut clean and square on the McKay line. Net effect of the installation was a definite increase in overall departmental efficiency.

H. J. Verner, chief engineer, remarked that the McKay roller leveler could process these grades of stainless, within its capacity, to flatness approaching that obtained from the stretcher method. He reported that the Die Shear Line is being used to prepare for shipping cold rolled sheet from 4" to 48" in width, up to .050" in thickness, and in lengths from 36" and greater at normal production speeds. He particularly likes the McKaymatic* Die Shear Line for its ability to handle high finish stainless without edge or surface damage.

Available in many sizes—The McKaymatic* Die Shear Line is available in sizes to accommodate most commercial widths. Composed of decoiler (with coil car, if desired), roller leveler, measuring device, and cutoff press, it satisfies most requirements for sheet length accuracy and squareness, flatness, edge and surface quality protection and output rate.

For short runs or long, the McKaymatic* Die Shear Line will better any other line in economy and efficiency. Whatever your cut-to-length problem, McKay Machine's engineers have a solution. Write for literature; send your specific needs for a quotation to McKay Machine Company, Youngstown 1, Ohio.

•TM

LOOK TO



FOR PROGRESS IN METAL PROCESSING

Circle 175 on Inquiry Card for more data

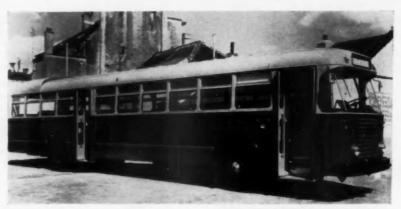
NEWS FEATURES

(Continued from page 151)

Air Force Accepts First Mach 2 Bombers

America's first supersonic jet bomber, the Convair B-58, has been accepted to become operational in the Strategic Air Command's Aerospace Force.

Twelve of the Mach 2 bombers



Hy-Power by HANNIFIN 5,000 PSI HYDRAULICS

Proved by more than 25 years use in the Automotive Industry



BETTER THAN EVER TODAY



FAST . QUIET . POWERFUL ... EASY TO MAINTAIN



PRODUCTION TOOLS

Used on trucks, trailers, automobiles and throughout industry

Used for riveting, punching, pressing, marking and press-fit assembly

GAP OR COLUMN PRESSES • POWER UNITS • CYLINDERS

STANDARDS AND SPECIALS

On use throughout the world

Call in your nearby Hannifin man-he's a trained production analyst-



HANNIFIN COMPANY

543 South Wolf Road - Des Plaines, Illinois

POINT IN THE NATION FOR FLUID POWER APPLICATION

WORLD'S LONGEST TWO-AXLE BUS?

This 42 ft. eight in. vehicle, one of a fleet built by Brossel Freres for Belgian Railways, is claimed to be the world's longest. They carry 57 passengers seated and 24 standing. Power is supplied by 150-hp Leyland Diesel.

have been turned over to the 43rd Bomb Wing at Carswell Air Force Base, Fort Worth, Tex.

Gen. Thomas S. Power, SAC commander-in-chief, said the B-58 will replace a part of SAC's B-47 Strato-Jet force, currently the backbone of SAC's retaliatory force.

SAE Seeking Papers On 31 Subjects

The committee planning next spring's Society of Automotive Engineers National Aeronautic Meeting has issued a call for papers on 31 topics. The meeting is scheduled for April 4-7, 1961, at the Commodore Hotel, New York City.

Topics range from Boost Rockets for Space Vehicles to Approach and Landing Problems and Take-Off Performance for Transport Air-Aircraft to Producing Honeycomb Structures. Deadline for receipt of offers of papers at SAE headquarters in New York is Aug. 29. Correspondence should be addressed to Planning Committee for the SAE National Aeronautic Meeting, Society of Automotive Engineers, 485 Lexington ave., New York 17, N. Y.

(Turn to page 174, please)

AUTOMOTIVE INDUSTRIES
KEEPS YOU INFORMED



Great new advance in hose rubber

New PARACRIL OZO—exciting development from the laboratories of Naugatuck Chemical—offers the makers and users of rubber hose a combination of properties never before available.

Hose of every description, for practically every purpose, can be tougher, less bothered by abrasion, more oil and weather resistant than ever before. And it can be produced in any permanent color desired! New PARACRIL OZO offers such advantages as:

- significantly superior ozone resistance
- excellent fuel and oil resistance
- several times greater abrasion resistance
- permanent retention of bright, uniform colors

Discover first hand the dramatic new sales possibilities this proven new rubber offers you. In increased product quality. In new production economy. For full information and whatever technical assistance you may require, contact your Naugatuck representative or write the address below today.



Naugatuck Chemical

Division of United States Rubber Company Naugatuck, Connecticut

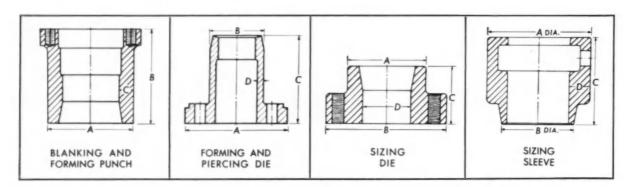


Rubber Chemicals - Synthatic Rubber - Pisstics - Agricultural Chemicals - Reclaimed Rubber - Latices - CANADA: Maugatuck Chemicals Division, Dominion Rubber Co., Ltd., Elmira, Ontario - CABLE: Rubesport, M.Y.

THIS HOLE IN GRAPH-MO HOLLOW-BAR®



lets you make ring-shaped tool steel parts faster, at less cost



START making your ring-shaped tool steel parts with Graph-Mo Hollow-Bar® and you save one operation immediately. You eliminate drilling because the hole is already there. Your first step is finish boring.

That's just the start of your savings. You can make parts faster because Graph-Mo machines 30% faster than ordinary tool steels. The free graphite in its structure is the reason.

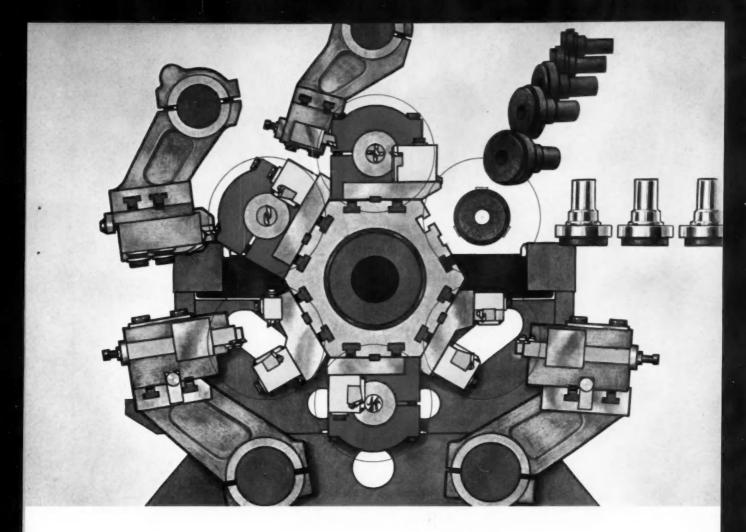
Graph-Mo wears longer because of the diamondhard carbides in its structure. Users report Graph-Mo outwears conventional tool steels by 3 to 1. And there's far less tendency to pick up, scuff and gall.

And for stability, you can't beat Graph-Mo anywhere. A master plug gage machined from Graph-Mo showed less than 10 millionths of an inch dimensional change after 12 years of use.

For your ring-shaped parts, save as other tool makers do. Specify Graph-Mo Hollow-Bar. It will save you time and money, give you better finished products. Sizes range from 2 to 16-inch O.D. Many wall thicknesses. When you buy Timken steel you get...1) Quality that's uniform from heat to heat, har to har, order to order. 2) Service from the experts in specialty steel. 3) Over 40 years experience in solving tough steel problems. Write The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.

TIMKEN Fine STEEL

TIMKEN GRAPHITIC STEFLS ARE AVAILABLE FROM STEFL SERVICE CENTERS IN 40 CITIES IN THE UNITED STATES AND CANADA



Open secret of New Britain superiority

Wide-open design makes the most fundamental difference between a New Britain automatic chucking machine and other machines. It speaks for itself as a means of getting at the tooling, making adjustments and clearing chips.

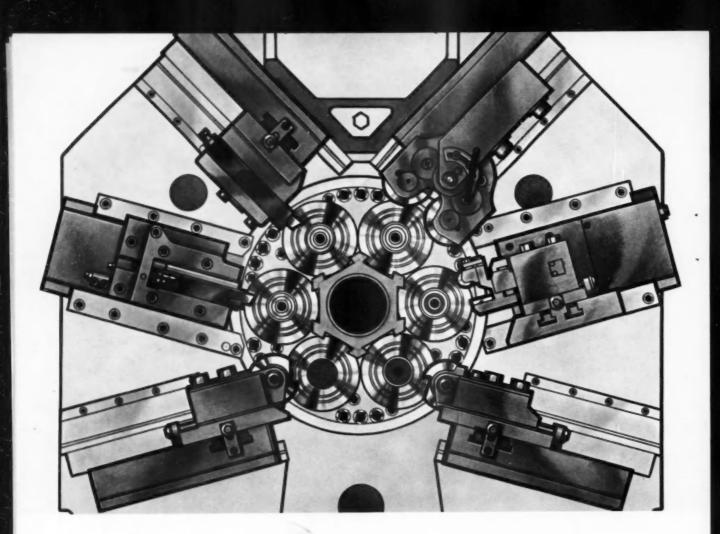
Massiveness, right from the floor up, is equally apparent and equally important in chucker work. You see it in the way the cutting tools make the heaviest cuts with a chatter-free smoothness that can't be duplicated.

Only New Britain provides a combination of longitudinal with transverse forming motion where needed. This versatility eliminates the need for second operation machines in many cases—particularly when a job is setup for double indexing for fast two-at-a-time production.

New Britain spares no pains to incorporate every new development to make chucker-type machining more profitable. The open-end design lends itself particularly well to magazine loading and unloading, for example, and many New Britains are being equipped to provide this feature.

Whenever a number of operations are required on cast or forged pieces, these massive, rugged, powerful machines offer great possibilities for savings through faster, more accurate, more reliable production. A new and complete catalog on the New Britain chucker line is just off the press. We would be very glad to send you your copy.

THE NEW BRITAIN MACHINE COMPANY
New Britain-Gridley Machine Division - New Britain, Connecticut



New Britain's answer to a serious threat

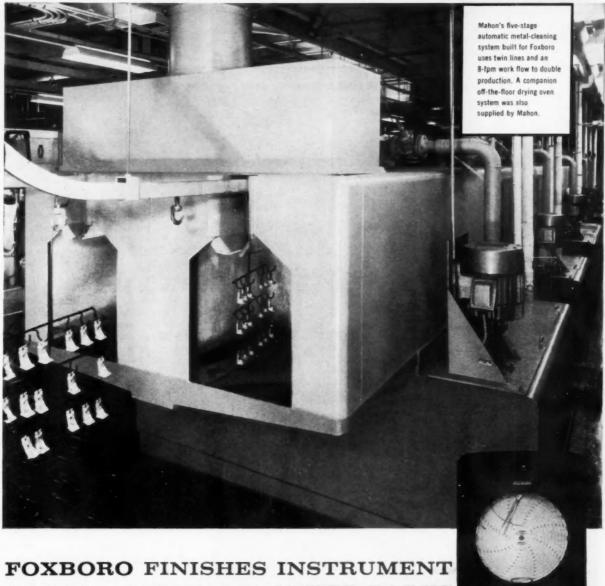
Overseas production of just about anything you care to name is making serious inroads on American domestic and foreign markets. It's no secret that European and Asian industry is catching up fast technologically—and they have a real competitive advantage in plenty of low cost skilled labor. While many foreign products are still inferior to those of domestic manufacture, this is far from true in all cases. The answer is, of course, increased productivity at lower cost.

In its all-new line of bar machines, New Britain has developed the most modern bar-turning units available. Five models in two different series are offered with capacities from $1\frac{1}{4}$ " to $5\frac{1}{8}$ ". These machines are designed for really fast, trouble-free, high-precision production. More operations

per machine are possible than ever before. Wide open tool areas allow unlimited combinations of end working and forming tools. New Britains will stay new longer. The exclusive wear-preventing features so familiar to New Britain users have been retained and improved. Catalogs on both the small and large series machines are yours for the asking. After looking this literature over if you think one or more New Britains may help improve your competitive situation, we will be happy to review your prints and arrange a demonstration. No obligation, of course. Call us or call your local representative.

New Britain-Gridley Machine Division, The New Britain Machine Company, New Britain, Connecticut.

THE NEW BRITAIN MACHINE COMPANY
New Britain-Gridley Machine Division - New Britain, Connecticut



FOXBORO FINISHES INSTRUMENT CASES...AND 20,000 OTHER PARTS AS WELL...WITH MAHON EQUIPMENT

The Foxboro Company of Foxboro, Mass. is meeting the stepped-up industrial need for control and measuring instruments. Two new Mahon Finishing Systems and other allied equipment were recently installed to help solve Foxboro's accelerated production problems for these high-quality, high-precision products. The result: an automatic metal-cleaning process, flexible enough to handle some 20,000 parts—efficient enough to double capacity; and a space-conserving off-the-floor drying-oven system that integrates all priming and finish painting. The Mahon-engineered and built equipment not only met new production requirements under improved working conditions but also offered color flexibility (six of more than 150 colors can be run at one time).

Improved finishing is probably the easiest... and most economical... product improvement you can make. Call in a Mahon engineer and get the facts on what Mahon can do for your product... your costs.

WRITE FOR MAHON CATALOG A-660 ALSO IN SWEET'S P. E. FILE

YOUR BIGGEST VALUE IS IN MAHON'S PLANNING & ENGINEERING EXPERIENCE

THE R. C. MAHON COMPANY

DETROIT 34, MICHIGAN
MANUFACTURING PLANTS—Detroit, Michigan and Torrance, California
SALES-ENGINEERING OFFICES—Detroit, New York,
Chicago, San Francisco and Torrance.

MAHON

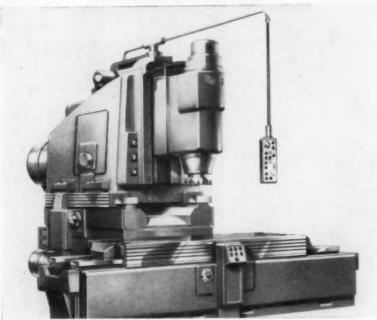
Automotive Industries, September 1, 1960

Circle 180 on Inquiry Card for more data

MACHINE TOOL EXPOSITION

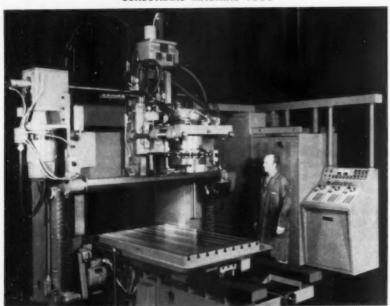
Continued from page 102

KEARNEY AND TRECKER CORP.



NUMERICAL CONTROL—This is a Milwaukee-Matic Model II, a self-contained "machine shop" that is completely numerically controlled, employing a standard 1 in. wide, 8-channel punched tape. This "machining center" will mill, drill, bore, ream, tap, select and change its own tools, feeds and speeds, and transfer the workpiece. This machining concept provides for a wide variety of simple or complex machining operations on a given workpiece. Booth 1008

SUNDSTRAND MACHINE TOOL



NUMERICAL CONTROL MACHINE—A new Vertical Spindle 3-Axis Numerically Controlled Rail Type Machine with a 20 unit Automatic Tool Changer will be shown by Sundstrand. The numerical control covers a 3-Axis range of 60 in. table travel 40 in. head cross travel and 24 in. head vertical stroke. The table positions at 150 IPM and feeds at rates infinitely variable between 4 and 150 ipm. Booth 1014

FOSDICK MACHINE TOOL CO.

AUTOMATIC TOOL CHANGING-Showpiece of this line is the new Fosmatic 54-P precision boring machine, complete with tape control of saddle, table, spindle speeds and feeds, spindle depth, head, and automatic tool changing. The tape control system is electro-mechanical with all its off-machine components housed in a single small console. It establishes head height and depth of cut through a built-in system of class A gages similar to that used in the fosmatic direct dimensioning measuring device. Head height and depth control make it practicable to use tools of random length on a numerically controlled precision boring machine.

The automatic tool changer on this unit holds up to 100 boring, drilling, and end-milling tools. It is controlled from the same tape control console which positions and controls the machine. Fosdick will also display the all-new Fosmatic 32 and 42 Jig Borers and Jig Grinders. Booth 800.

Circle 361 on postcard for more data

KINGSBURY MACHINE TOOL CO.

TAPPING MACHINES—Three tapping machines will be shown in this manufacturers booth.

Of these three basic types of machines the most outstanding one is the first one with 63-inch index table because it can perform many operations in wide variety in one chucking of the work. It has 12 stations and 17 automatic units, ten on the center column and seven on wing bases.

Each machine is designed and built with suitable automatic units and special tooling to perform specified operations on one part. The units here include seven different models, four for drilling operations and three for tapping. Some are horizontal, some vertical, and some at an angle.

Standard attachments show how many operations can be performed in the same chucking with drilling and tapping operations, such as milling, boring, and recessing. There is an oscillating head, a two-spindle head, and a planetary speed reducer. A bushing carrier guides tools, a two-position hydraulic slide offers additional stroke, and a speeder runs at 14,800 rpm. There is a flange type spindle, a high-pressure coolant distributor for gun reaming plus tool and tap holders of various types. Booth 731.

Circle 363 on postcard for more data

GREATER RUN-IN PROTECTION EXTENDS PISTON LIFE OF CURTISS-WRIGHT ENGINES

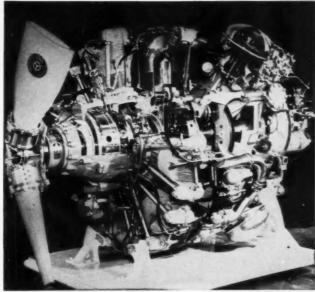


Photo courtesy of Curtiss-Wright Corp.

Curtiss-Wright Corporation's Wright Aeronautical Division, located at Wood-Ridge, N.J., has extended the "life span" of pistons used in their radial reciprocating airplane engines. By coating piston skirts with 'dag' 213 — a dispersion of graphite in an epoxy-resin binder — they are protected against scuffing, scoring, galling, and seizing during the critical running-in period.

Where previously Curtiss-Wright engineers had used finely powdered graphite and phenolic resin, they found that 'dag' 213 was more uniform in consistency and had better adhesion . . . was actually adsorbed by the surface to form a more durable, corrosion-resistant film that became virtually integral with the metal. Due to the heat-transmission properties of 'dag' 213, the coefficient of friction is kept at a uniform minimum to assure free action and proper wear-in characteristics. The exacting clearances in reciprocating engine design make the run-in process so critical that perfect friction and heat control must be maintained under the speeds and loads required. In addition, the graphoid surface takes over the job of supporting the load if the liquid lubricant ruptures momentarily during run-in, thereby preventing metal-to-metal contact until the oil film re-establishes itself.

'dag' 213 is spray-applied at Curtiss-Wright with conventional spray equipment. After the piston skirts are coated, the pre-assembled pistons are oven-heated at 350°F for 2½ to 3 hours. Fabrication and treatment techniques used at Curtiss-Wright permit a high degree of accuracy in maintaining piston and cylinder wall tolerances. Only forged aluminum alloys are used for these pistons which operate within nitrided steel cylinder walls. The application of Acheson's 'dag' 213 has been extended to all models of Curtiss-Wright engines in both their 18 and 9-cylinder categories, Investigate the use of an Acheson Dispersion in your own assembly or run-in application. Write Dept. AI-90.

New Literature Describes Assembly and Run-in Uses

The value of Acheson Dispersions as additives in assembly and run-in lubricants is described in easy-to-read form in a recently printed brochure, Bulletin 421. A copy for your personal file is available immediately upon request.

It covers the many advantages Acheson customers are gaining in these critical applications by using colloidal dispersions which:

- Provide smoother bearing surfaces through control of the wear rate.
- Permit closer tolerances due to their microscopic, flat particle size.
- 3. Allow increased power because of reduced friction.
- cause of reduced friction.

 4. Lower bearing temperatures.
- 5. Increase the affinity of mating metal surfaces for oil.
- 6. Lessen oil consumption.
- 7. Shorten the period necessary for run-in.
- 8. Protect against momentary oil failure.
- Lower maintenance and replacement costs.
- Insure a longer, more trouble-free equipment operating life.

If you are concerned with the design or manufacture of engines, motors, bearing assembly, or machinery, Bulletin 421 should prove of interest to you. The vital contribution which Acheson Dispersions of colloidal graphite or molybdenum disulfide make in safeguarding against excessive wear during running-in, is a matter of record. Also, Acheson dry film lubricants, used in assembly press fit applications, are providing effective lubrication without sacrificing the tolerances involved. Send for your copy of Bulletin 421, "For Assembly and Run-in Lubrication".



'dag' is a trademark registered in the U.S. Patent Office by Acheson Industries, Inc.





ACHESON Colloids Company PORT HURON, MICHIGAN

A division of Acheson Industries, Inc. Also Acheson Industries (Europe) Ltd. and affiliates, London, England

Boston • Chicago • Cleveland • Dayton • Detroit • Los Angeles • New York • Philadelphia • Pittsburgh • Rochester • St. Louis



VIBRATION DAMPERS

another engineering development of

SCHWITZER



the answer to
the most rugged torsional
damper requirements
of modern, high output engines

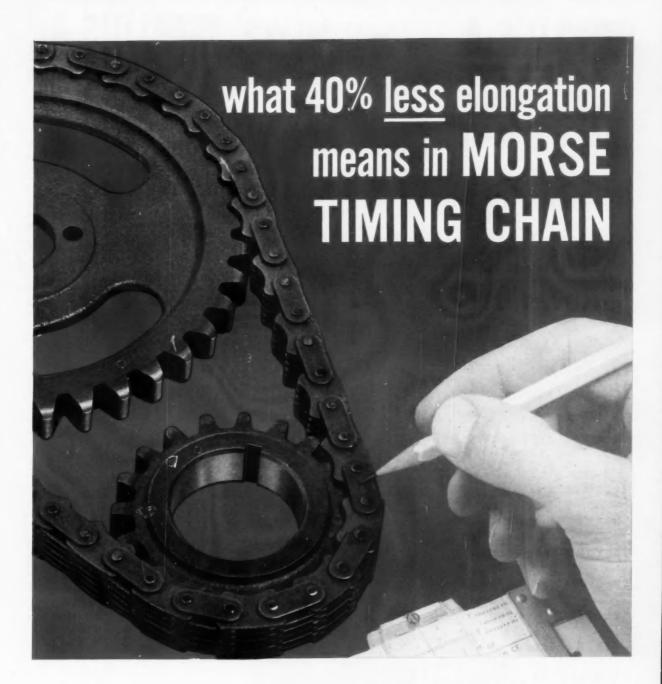
Let the "New Approach" by Schwitzer help solve your most complex problems in Vibration Damping and Isolation

COUPLINGS · FAN DRIVES · DAMPERS · ISOLATORS · MOUNTINGS

REGISTERED TRADE MARK

SCHWITZER

SCHWITZER PRODUCTS ARE MANUFACTURED INTERNATIONALLY



The timing chain in your car is most likely built by Morse. Practically all American and Canadian automotive engineers specify this make. These men know from experience that with Morse precision-built timing chain they get 40% less elongation than with any other make. That means more accurate engine timing for thousands of miles beyond normal engine life expectancy.

To accomplish this higher durability, Morse chain design uses bar-link construction on every other pitch. Locked linkage of this type prevents chain from stretching in spite of wear. Improved materials and the latest statistical control of metallurgical processes supplement the bar-link advantages to insure split-second timing for thousands of additional miles.

Reasons like these explain why engine builders cannot buy a quieter, more dependable timing chain anywhere else in the world. For further information on the chain that cuts elongation 40% write: Morse Chain Company, Dept. 36-90, Detroit, Michigan; or Ithaca, N.Y. Export Sales: Borg-Warner International, Chicago 3, Ill. In Canada: Morse Chain of Canada, Ltd., Simcoe, Ont.



A BORG-WARNER INDUSTRY

AUTOMOTIVE INDUSTRIES, September 1, 1960

Circle 185 on Inquiry Card for more data



YOU CAN DO BETTER WITH



STAMPING KNOW-HOW



Because we make
HEATING stampings for
the widest of
HARDWARE varieties of
diversified
AUTOMOTIVE industries
from coast
PHOTOGRAPHIC to coast
our broad
ELECTRONIC experience
and know-how
AIRCRAFT assure you
top quality—
COOLING fast delivery.





Circle 186 on Inquiry Card for more data

• NEWS FEATURES

(Continued from page 164)

Vigilante Completes First Phase Tests

North American Aviation's A3J Vigilante, the Navy's new attack plane, has completed the first phase of its carrier suitability trials. The week-long tests were conducted aboard the USS Saratoga off Mayport, Fla.

The sleek Mach 2 bomber, designed and produced by NAA's Columbus Div., was put through its paces by pilots from the Naval Air Test Center, Patuxent River, Md., where the craft underwent various pre-carrier tests.

The Vigilante made 15 catapult launches during its first carrier demonstration. Its pilots also made several "touch-and-go" landings and the plane was given general carrier suitability checkouts.



Dr. James R. Dudley has been elected president of The Commercial Chemical Development Association.

Heads Tax Committee

Alan L. Gornick, director of tax affairs, Ford Motor Co., has been elected chairman of the Taxation Committee of the Automobile Manufacturers Association.

(Turn to page 176, please)



YOU CAN DO BETTER WITH



CLAMP-ABILITY



No matter what the size or shape, when you need constant, accurate holding power, the sturdy "clampability" of De-Sta-Co Toggle Clamps is the answer.

More than 25 years of manufacturing experience is reflected in each of over 140 models—from the 1-oz. Tiny Toggle with 50 lbs. holding pressure to the giant 5-lb. model with 2-tons of clamping force.

And for the unusual application, our engineers will show you how easily one may be adapted. Inform yourself about De-Sta-Co "CLAMP-ARILITY"

FOR MORE FACTS
REQUEST
INFORMATIVE CATALOG
YOU CAN
DEPEND ON DE-STA-CO



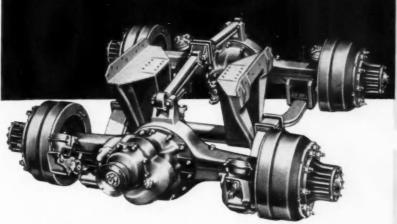
Circle 187 on Inquiry Card for more data

MORE THAN 200 MILLION EXTRA TON-MILES OF PAYLOAD IN JUST 5 YEARS



Driver Controlled Inter-exie Differential. Allows differential action between the axles to compensate for worn or mismatched tires... both axles do equal amounts of work. Can be dis-engaged at any speed giving positive thru-drive when better traction is needed.

WITH TIMKEN-DETROIT® LIGHTWEIGHT TANDEMS



Stronger Gear Sets. Hypoid gearing provides up to 30% more strength than spiral bevel gears of the same size. Modern hypoid design allows larger and stronger pinions with greater tooth contact area . . . assuring top efficiency

In the five years since Rockwell-Standard introduced Timken-Detroit Lightweight Tandems, thousands of users have rolled up millions of extra ton miles of payload. Check the superior features illustrated at right. They are some of the reasons why these axles are first choice with over-highway operators:



- In-line drive reduces wear on working parts
- Large selection of gear ratios
- interchangeability
 - · Torsion-Flow axle shafts

· High degree of parts

• Wide range of capacities - 8 models from 22,000 to 44,000 pounds



New Suspension Pushes Tandem Weight Savings Over 1000 Lbs. Rockwell-Standard's "Laper-leaf" springs coupled with the latest in balanced suspension system designs is up to 475 lbs. lighter than comparable units. When combined with the payload advantages of the Lightweight Tandem you can save more than 1000 pounds per trip. This means thousands of ton-miles in extra payload

Another Product of ... ROCKWELL-STANDARD

Transmission and Axle Division, Detroit 32, Michigan



NEWS FEATURES

(Continued from page 174)

Record Sales, Net Reported by Dow

Dow Chemical Co. has reported record sales and earnings for its fiscal year ended May 31.

Its \$82.4 net, equal to \$3.01 a share, was up from \$62.9 million



MOLINE

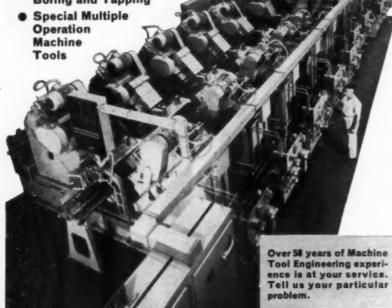
FOR

PRODUCTION · EFFICIENCY · SAVINGS

Use rugged, reliable "Hole Hog" machine tools for such jobs as:

- Multi-Spindle Boring Single and Multi-Spindle Honing
- Straight Line Multi-Drilling
- Adjustable Spindle Drilling

 Vertical and Way-Type Fixed Center Drilling, Boring and Tapping



112

Twenty-Station, Ten-Unit Transfer Machine for boring, counterboring, chamfering and valve clearance operations on V-8 automotive engine blocks. (Shown above)



MOLINE TOOL COMPANY
100 20TH STREET ' MOLINE, ILLINOIS

REPRESENTATIVES IN PRINCIPAL CITIES

VIGILANTE UNDERGOES CARRIER TESTS

An A3J Vigilante Mach 2 bomber is about to touch down on USS Saratoga during recent trials. Built by North American Aviation, Inc., it is making touch-and-go landing in which it takes off immediately after touching down.

and \$2.39 a share last year. This is a rise of 31 per cent.

Sales rose 11 per cent to \$781.4 million from \$705.4 million in 1959.

Leland I. Doan, president, said Dow faces competition from many directions, pressure on profits and an inevitable rise in certain costs. He added that despite a vigorous overseas expansion, Dow has considerably more expansion in progress and in the planning stage.

He revealed Dow spent \$102 million on plant and property additions in the 1960 fiscal year as compared with \$59 million the previous year.

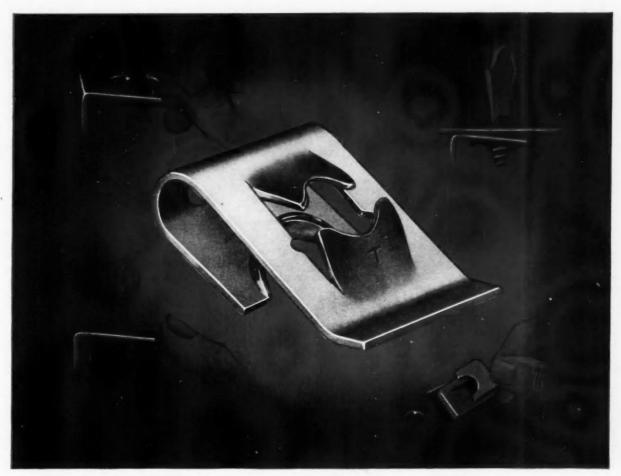
The company's sales were broken down as chemicals, 51 per cent; plastics, 36 per cent; magnesium, seven per cent, and agricultural chemicals, six per cent.

Motor Products Buys Bertram Yacht Co.

Motor Products Corp. Detroit, has purchased Bertram Yacht Co., Inc., Miami, Fla., for cash. The price was not disclosed.

The new subsidiary will be headed by Richard H. Bertram, a yacht broker. It will manufacture 30-ft glass fiber powerboats.

Land will be acquired for a new facility in Miami and plans call for 36-ft, 43-ft and 55-ft cruisers to be added to the line.



Another Tinnerman Original ...

Self-retaining "U" and "J" SPEED NUTS cut assembly costs up to 50% or more!

If you are worried about rising assembly costs, let one-piece "U" and "J" Speed Nuts keep costs down...and improve your product.

They can't fall off, once they've been pressed into screw-receiving position. No welding, staking or other secondary fastening devices needed. You eliminate lock washers—spring steel Speed Nuts are self-locking, make vibration-proof attachments.

Speed Nuts are ideal for blind assembly or hard-to-reach locations. Apply them *before* you paint panels without danger of paint-clogging. Or *after* porcelainizing, without damage to finishes. The "U" type is similar to the "J" type, shown above, but is used where full bearing surface on the lower leg is required.

A free Fastening Analysis can tell where Speed Nut brand fasteners belong on your

products. Call your Tinnerman representative —he's listed in most major telephone directories. Or write to:

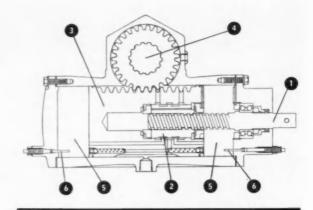
TINNERMAN PRODUCTS, INC. Dept. 12 · P.O. Box 6688 · Cleveland 1, Ohio



CANAGA: Dominion Fastoners Ltd., Romitton, Outario, CREAT BRITAIN: Simmonds Berucessories Ltd., Treforest, Wales. FRANCE: Simmonds S. A., 3 rue Salomon de Bothschild, Suresons (Soine). GERMANY: Necaso-Bundy GmbH, Heidelberg.

Design and Operation of the SHEPPARD POWER STEERING GEAR

Working parts of Sheppard power steering gear are: (1) actuating shaft, (2) actuating valve, (3) actuating piston, and (4) output shaft assembly. Nos. (5) and (6) indicate, respectively, the end sections of power cylinder and the adjustable stops.



SIMPLICITY of design, integrated construction, and quick operating response are major features of the Sheppard heavy-duty power steering gear. Its design characteristics and principle of operation are described in the following:

There are only four moving parts. These are (1) the actuating shaft, (2) the actuating valve, (3) the actuating piston, and (4) the output pinion and shaft assembly.

The actuating shaft (1) which is attached to the steering shaft

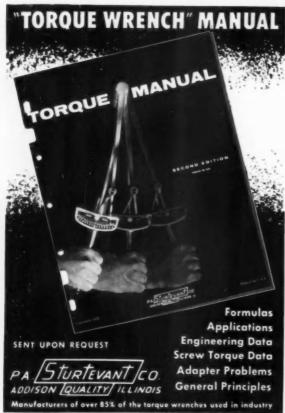
and wheel assembly, has a heavy Acme-type thread. This shaft is assembled in the cylinder head of the steering gear by locking nuts, and operates on a double-row ball bearing.

The actuating valve (2) is threaded on its ID to accommodate the thread of the actuating shaft (1), and is housed within the piston (3). Thus, when the actuating shaft is turned, the valve travels back and forth over the threaded area of the actuating shaft and in

the cavity of the piston.

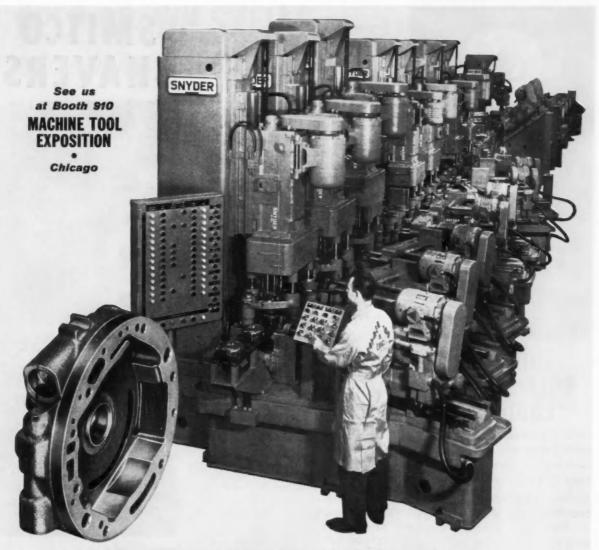
On the OD of the actuating valve (2) there are two ports. These ports direct oil through the actuating piston (3). The valve is allowed about 1/32 in. linear motion within the piston. This permits the edges of the ports to seat against mating edges within the piston.

Pressurized oil is thereby directed to either end (5) of the cylinder, governed by the direction of rotation of the steering wheel and



Circle 191 on Inquiry Card for more data





SNYDER BUILDING-BLOCK PRINCIPLE MAKES TRANSFER MACHINES VERSATILE, CONVERTIBLE, THRIFTY

Transfer machines built up on the "building-block" principle are old stuff at Snyder and we've built all kinds of them—including the ones that turn corners and bring the part back to where it started from, processed from half-a-dozen angles, gaged, probed, automatically inspected in process, washed and dried and rejects marked for re-processing. Nothing to it if that's what the job calls for. We call it the Snyder Building-block Principle.

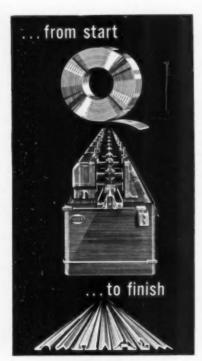
Here's an example of a fairly simple Snyder building-block transfer. This 58 station machine performs 74 operations on an automatic transmission pump body, drilling, reaming, tapping, gaging and probing 180 parts an hour at 100% efficiency. Any or all of its 22 segments can easily be converted to perform comparable operations on other parts. Also, the number of segments can be reduced or increased at any time, as need dictates. Your inquiries are invited.

SNYDER

CORPORATION

(Formerly Snyder Tool & Engineering Company)

3400 E. LAFAYETTE—DETROIT 7, MICHIGAN
Phone: LO 7-0123



YODER ROLL-FORMING EQUIPMENT

Profits are available to you through the production of many shapes in metal... made with precision and economy on Yoder Cold Roll Forming Equipment.

Produce tubular, ornamental or structural shapes from a variety of metals in widths from a fraction of an inch up to 80 inches or more, and in stock up to 34" thick. Your investment is comparatively modest, and with proven low operating costs, will give you one of the most profitable operations in your plant.

Experienced Yoder engineers will, without obligation, study your annual metal forming requirements. Many times they can point out that the installation of roll forming equipment would—even if operated only intermittently—soon justify its initial cost.

Send today for this comprehensive, 88-page illustrated text. It fully describes Cold Roll Forming Equipment, processes and products.



THE YODER COMPANY
5553 Walworth Avenue • Cleveland 2, Ohio



COLD ROLL FORMING MACHINES

Circle 195 on Inquiry Card for more data

its connected actuating shaft (1). At the same time, the non-pressurized port serves to exhaust the opposite end of the cylinder.

Basically, the piston (3) tends to follow the valve (2) wherever the valve is positioned by the actuating shaft (1). It is this action which brings about steering movement. When the piston (3) centers itself over the valve (2), steering movement ceases—until the actuating valve is again moved to another location within the piston.

A toothed rack on one side of the piston (3) engages the pinion of the output shaft assembly (4). Therefore, as the piston moves back and forth within the cylinder, the pinion of the output shaft assembly is rotated.

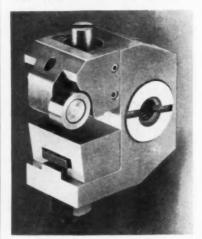
All of the power steering gear parts, including the valving and power cylinder, are, as will be noted, contained in one integral housing. One high-pressure hose and one return hose only are connected to the hydraulic pressure source. This construction and hookup are said to afford responsive steering with no lag or spongy feel.

Also incorporated in the Sheppard power steering unit are adjustable stops (6). These stops (one at each end of the cylinder) consist of pins which are adjustable by turning threaded studs. Inside the piston (3) are two springloaded ball valves which work in conjunction with the pins. As the piston travels to either end of its stroke, the pin in that end of the cylinder unseats the ball and relieves the hydraulic pressure in the opposite end of the cylinder. Consequently, these pin stops may be adjusted to conform with the desired maximum travel of the pitman arm, at which point the hydraulic system is automatically un-

The Sheppard power steering gear is made by R. H. Sheppard Co., Inc., Hanover, Pa. It is available in seven models for steerable axle weights ranging from 5000 to 60,000 lb.

AUTOMOTIVE INDUSTRIES KEEPS YOU INFORMED

SMITCO SHAVERS



HOLD CLOSE TOLERANCES



Work proved SMITCO Form Shavers are "shaving" production time and costs to a bare minimum on B&S automatics by holding close tolerances and the fine finishes.

Used with the standard SMITCO adapters, they mount easily on the front or rear cross slides, and SMITCO design enables machining with spindle running forward or reverse.

Offset roll can be easily substituted for the standard roll for close collet work and adjustable spring float allows for proper tension to shave various diameters.

Cutting blocks are easily removed, sharpened and replaced without disturbing holder, maintaining downtime to a minimum.

Shave Tools and adapters available for various makes of single and multiple spindle automatics.

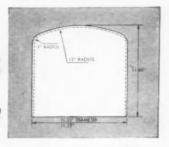
WRITE FOR LITERATURE & COMPLETE INFORMATION



Circle 194 on Inquiry Card for more data

DEEP-DRAWN SHELLS FORMED IN SINGLE DRAW ON STEELWELD SPEED-DRAW PRESS

Draw Is Greater than 50% REDUCTION from Blank Size



This shell is stamped in a single draw from a 22¾ inch diameter steel blank. Material is 0.1644" draw-type steel.

Model D1-400-48-54 Steelweld Double-Action Speed-Draw Press rated 400 tons capacity with 48 x 54 inch slide area.



Some of the great number of shells produced daily. All dimensions are held accurately to specifications and the stampings are smooth and uniform.

A new kind of press with unique, patented toggle-eccentric mechanism stamps shells for air-conditioning units in a single draw from 22¾" dia. blanks to dimensions shown in sketch.

The unusual operating principle of the Speed-Draw Press permits making extra long draws at higher speeds than shallow draws can be made on a standard cranktype press. The deep-draw feature frequently reduces the number of operations required to form a part and often permits operations that are not possible on a standard press. Because of these advantages, parts can normally be produced at a far greater speed on a Steelweld Speed-Draw Press.

Write for free catalog No. 2029

STEELWELD SPEED-DRAW PRESSES

Steelweld Machinery includes: Shears and Press Brakes, One-, Two- and Four-Point Straight-Side Presses, Speed-Draw Presses.

STEELWELD MACHINERY DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 4703 E. 280 ST. • WICKLIFFE, OHIO

model 74 Lapmaster

new compact
machine design...
more production lapping efficiency, yet
takes less floor area... easy hand-wheel
adjustment of conditioning rings to
keep lap plate flat.

new, larger, adjustable work table... wrap-around design for fast loading, unloading from almost any position... pneumatic lifts to facilitate work handling or to provide extra down pressure.

new abrasive distribution system... pressure pump at constant head for uniform deposits at lapping stations... assures uniform cutting action to control the amount of stock removal... always maintains correct abrasive mixture... provides adjustable flow control.



Compound and vehicle distribution pump and tank swing out for filling ease, swing in, out of the way, during production.

SEE THE NEW LAPMASTER AT BOOTH 550, COLISEUM MACHINERY SHOW, CHICAGO, SEPTEMBER 7-15. ALSO . . . REQUEST OUR NEW CATALOG OF OTHER LAPMASTERS. A product of

CRANE PACKING COMPANY

6435 Oakton Street, Morton Grove, Illinois (Chicago Suburb) In Canada: Crane Packing Company, Ltd., Hamilton, Ont.

PRECISION LAPPING ON A
PRODUCTION BASIS



Thor

Everything you want in 360 CYCLE Grinders...

25% faster metal removal. Compare it with any other type grinder.

30% saved on wheel cost. Constant speed gets maximum cutting power from the abrasives.

8% speed loss under full load-which saves you . . .

80% on power cost.

30% is the minimum overall saving.

100% best buy in High Frequency Electric Grinders!

Thor's straight or right angle models of 360 Cycle Grinders are available in 21 speeds, from 3700 to 21,600 R.P.M. Thor furnishes complete equipment for demonstrations in your plant. Call your Thor factory representative. Thor Power Tool Co., Aurora, Illinois. Branches in all principal cities.

and more!



Solve your heavy-duty power problems with Cotta heavy-duty



HEAVY-DUTY TRANSMISSIONS

COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS

Circle 200 on Inquiry Card for more data

transmissions!

Is full engine power out of reach because your gearbox can't handle the heavy-duty loads? Cotta power transmission specialists can customize standard transmissions to meet your individual heavy machinery requirements: multispeed, forward and reverse, space limitations, continuous day and night operation, weight, mounting, and other special needs for your own exact applications.

Cotta takes over where standard transmissions and gearboxes quit, in capacities from 150 to 2500 ft-lb input torque. For half a century Cotta has built precision transmissions for power shovels, locomotives, drilling rigs, rock crushers, pumps, and generators.

See our catalog in Sweet's Product Design File. Check the detailed descriptions on standard and custom applications. Then call Cotta (TWX-RK 7720 or phone WO 4-5671) for transmissions that withstand vibration and shock loads on the toughest construction, mining, and industrial jobs.

Circle 201 on Inquiry Card for more data-



FLEET OWNERS BODY BUILDERS

YOUR SHOP SHOULD NOT BE WITHOUT THIS VALUABLE MANUAL!

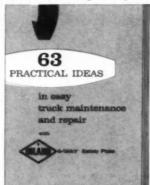
******* IT'S FREE!

"63 PRACTICAL IDEAS ON TRUCK MAINTENANCE AND REPAIR WITH INLAND 4-WAY SAFETY PLATE"

- · Bumpers and tailgates
- · Steps, ramps, walkways
- · Floors and interiors
- · Exterior, interior trim
- · Replacement fenders, floors
- · Hatches and access ladders
- · Bulkheads, cab protectors
- · Shop applications

A wealth of information that can make your maintenance job easier, more efficient and less costly.

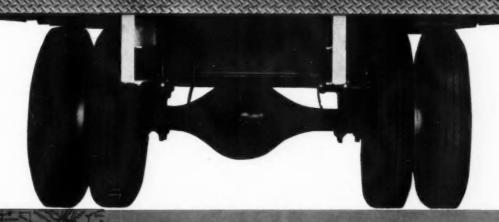




****** **4-WAY**

SAFETY PLATE . . . the tough steel plate with the distinctive raised-lug pattern, can make your trucks and trailers stronger, safer and more attractive. 4-WAY comes in three pattern sizes and in thicknesses from 18 gage to 1/4". This practical handbook, designed for use in fleet maintenance and truck body building shops, offers clear, easy-to-understand ideas that you can USE. Whether the job be repair, or as part of original equipment, Inland 4-WAY Safety Plate offers more versatility, more protection and more safety, than any other rolled steel plate material.

INLAND 4-WAY SAFETY PLATE



Mail this card to your STEEL SERVICE CENTER or to Inland Steel Company, 30 W. Monroe Street, Chicago 3, Ill. FOR FURTHER INFORMATION ON HOW TO OBTAIN YOUR FREE COPY OF THIS MANUAL, TURN THE PAGE.

STAMP HERE



Your Steel Service Center can supply you with 4-Way Safety Plate and many other Inland Steel Company products. The Manual described on the reverse side of this page is an example of the many services offered by your Steel Service Center.

Whatever your need—emergency—rush job—or the steady flow of steel items delivered into your shop or plant exactly as scheduled and precisely when you need the material...you can depend on STEEL SERVICE CENTER reliability!

What's more, your Steel Service Center is equipped to cut sheets or plates to your requirements provide the right steel for your design and fabrication problems.

Dealing with your Steel Service Center is like adding both a staff of experts and costly facilities to your operation without investing a penny. You save on inventory, storage space and man power.

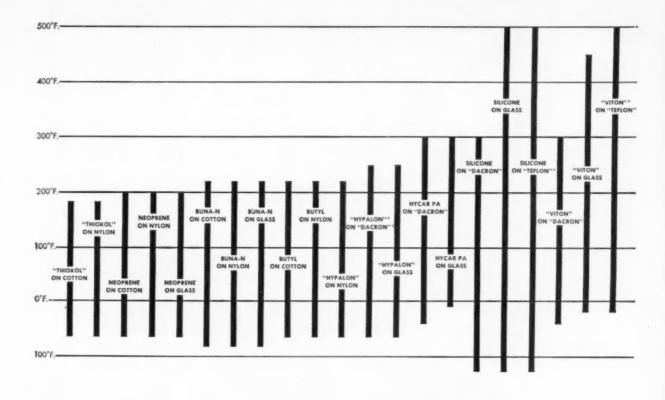
~	mail this card today	
Sirs:		
	COPY of Inland Steel Company's ''63 Practical Ideas in Easy ir with Inland 4-Way Safety Plate.''	
NAME		
COMPANY NAME		
ADDRESS		
CITY	ZONE STATE	

THIS REPLY CARD WILL BRING YOU INLAND STEEL COMPANY'S NEW MAINTENANCE AND REPAIR MANUAL WITHOUT COST OR OBLIGATION.

Simply fill in the necessary information and address it to your Steel Service Center, or to Inland Steel Company, 30 W. Monroe St., Chicago 3, Ill.

> See other side of this page for description of FREE OFFER.

INLAND STEEL COMPANY
30 W. Monroe Street
Chicago 3, Illinois



Upper serviceable limit is the highest temperature at which the material can be folded 180° back upon itself without cracking after 72 hours' exposure. Low limit is the lowest temperature at which the material can be bent around a 1" mandrel after 1 hour's exposure,

Temperature effects on the serviceability of Du Pont Fairprene

Charted above are the service able temperature ranges for many of Du Pont's "Fairprene"* coated fabrics. These materials form design materials of amazing versatility with an outstanding range of lubricant, solvent, flex, ozone, age and chemical resistance as well as thermal stability.

Du Pont engineers are eager to help you evaluate "Fairprene" for designing new products or improving old ones. These versatile materials are now being used in hundreds of applications ranging from fire walls to gaskets and diaphragms. For full information and your free copy of Du Pont's coated fabrics manual, mail coupon or write: E. I. du Pont de Nemours & Co. (Inc.), Fabrics Division AI-09, Wilmington 98, Delaware.

*A Du Pont registered trademark.

FREE COATED FABRICS

12-page booklet describes in detail all basic specifications, properties, uses and performance characteristics for "Fairprene"* coated fabrics and cements. Mail coupon or write Du Pont... there's no obligation.



Better Things for Better Living . . . through Chemistry

E. I. du	Pont de	Nemo	urs & Co. (I	nc.)	
Fabrics	Division	AI-09,	Wilmington	98,	Delaware
Please s	end free	inform	ation on:		

""Fairprene" coated fabrics Du Pont technical service
I am interested in using a coated fabric for______

 Name_______Position______

 Company_______

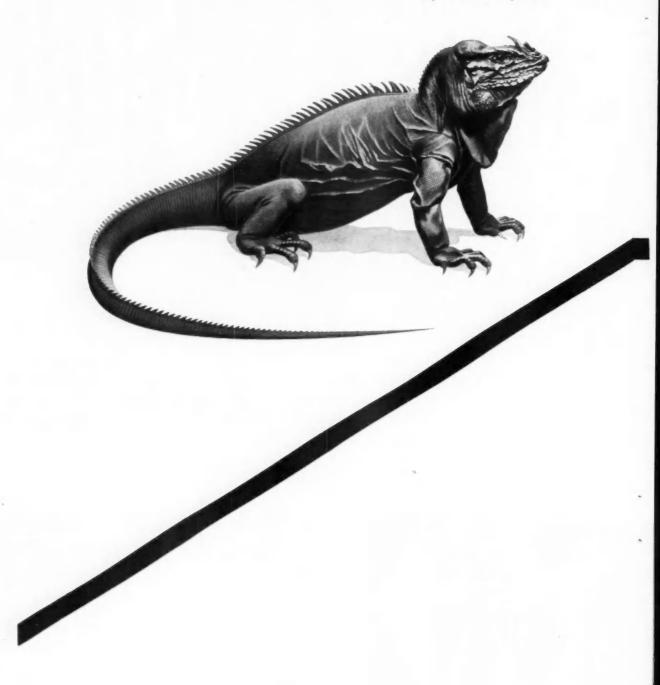
 Address_______

 City________State_______



An Iguana will be recognized... by a HERPETOLOGIST

(specialist in reptiles)



potential savings will be recognized... by a LINCOLN man

(specialist in arc welding)

ANY IDEA which can cut welding time from 90 to 45 minutes on missile beams for the Army is darned important! That's exactly what happened in a New Jersey plant.

A LINCOLN Field Engineer was walking through the plant with the Welding Foreman and

A LINCOLN Field Engineer was walking through the plant with the Welding Foreman and Plant Manager. Naturally he was interested in watching the welding operation on missile beams. A thought crossed his mind. He asked if he could demonstrate LINCOLN Jetweld electrodes on the beams. He rolled up his sleeves; took some Jetweld from the trunk of his car, and cut the welding time from 90 to 45 minutes. The weldors on the job did the same. That afternoon the Field Engineer finished his plant tour and spotted some applications for Fleetweld 37 electrodes for welding sheet metal on trailer bodies. Again welding time was cut almost in half, cleaning time reduced and overall costs slashed to the bone.

Quite a day's work for one Field Engineer . . . but putting PROFIT into welding operations is part of each LINCOLN man's job. You can count on him to show you . . . not tell you how to cut costs and make more money.

That's why we say it's a good idea to do business with LINCOLN where arc welding is a specialty and cost reduction comes to you as a "plus" at no charge.

Call your LINCOLN Field Engineer today.

THE LINCOLN ELECTRIC COMPANY

Dept. 1730 . Cleveland 17, Ohio



from the Udylite supplies network you get . . .

QUALITY, QUANTITY, SERVICE









From the moment your supplies order reaches Udylite it is subjected to a complex series of checks . . . to assure you of efficient service and fullest satisfaction.

We check for Quality—experienced personnel avert costly errors by questioning the order. This goes on through the order department, the teletype network and the warehouse until your order is finally placed aboard carrier. Even then, if need be, it will be followed by our experienced traffic department clear to its destination.

We check the Quantity—the size of your order will determine where it can best be filled at any one of 20 warehouses carrying Udylite supplies. Careful analysis here means important savings for you.

The same careful screening of your order takes place regardless of the quantity or dollar volume involved. Find out just how much you can benefit from this Udylite service...try it today.

world's
largest
plating
supplier



corporation • detroit 11, michigan

on the west coast: L. H. Butcher Co.



With Extras . . . At No Extra Cost

- METAL PISTON ROD SCRAPER—protects rod packing, cylinder bore and rod surface by removing all foreign particles.
- 2. NEW "SUPER" CUSHION for air or METALLIC SELF-ALIGNING MASTER CUSHION for oil.
- HARD CHROME PLATED CYLINDER BORES AND PISTON RODS for greater protection and reduced wear.
- ONE PIECE PISTON assures better alignment, longer bearing and packing life.
- FORGED SOLID STEEL HEADS throughout entire line.
- PILOTED PACKING GLAND with extra long bearing for additional strength and support to piston rod.
- NO TIE-RODS TO STRETCH—gives you 360° port rotation . . . less space used . . . full strength.
- 8. STREAMLINED DESIGN...operating pressures to 200 PSI, air; 1,000 PSI oil, non-shock.

T- Spacemaker

for longer, more efficient cylinder service

You too-can reduce replacement expenditures –lower maintenance costs with the T-J Spacemaker cylinder line. Designed and engineered for ruggedness, and accuracy of operation, the Spacemaker assures longer, uninterrupted operation.

The T-J Spacemaker eliminates tie-rods, gives greater strength, saves space... and reduces costs in all push-pull operations. Immediate delivery in a complete range of styles and capacities... air or oil. Write for Bulletin SM 155-4, today. The Tomkins-Johnson Company, Jackson, Michigan.



#1 Piston choice of Diesel Engine Builders KEEPS ENGINES POWERFUL LONGER-AT LOWER COST

Exclusively DOUBLE BONDED

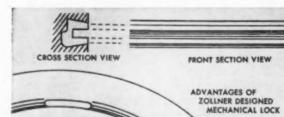
"Ni-Resist" IRON TOP RING SECTION

MECHANICALLY
Zollner Lock

Stops Ring Groove Wear

Everywhere, engine builders and transport operators enthuse over the performance of Zollner Bond-O-Loc Pistons — "The greatest mileage piston we have ever used. Top ring groove wear problems are eliminated by the 'Ni-Resist' Iron section permanently incorporated with the double bond of both A1-Fin metallurgic and the exclusive Zollner mechanical lock." For longer piston life, better performance and lower maintenance cost, we suggest your immediate test of Bond-O-Loc advantages.



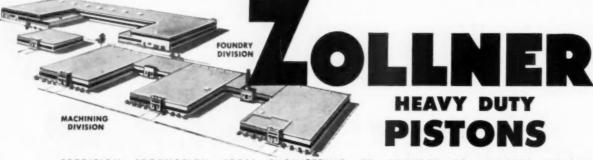


TOP SECTION VIEW

INSIDE SECTION VIEW

- Reverse angle designed top ring section with tapered flutes, dovetail locks in all directions.
- 2. Positive mechanical interlock prevents any movement.
- 3. Reduces weight 25% to 30% with lower inertia stresses.
- 4. Increases surface areas carrying inertia load.

ZOLLNER CORPORATION . FORT WAYNE, INDIANA



PRECISION PRODUCTION FROM ENGINEERING TO FOUNDRY TO FINISHED PISTONS



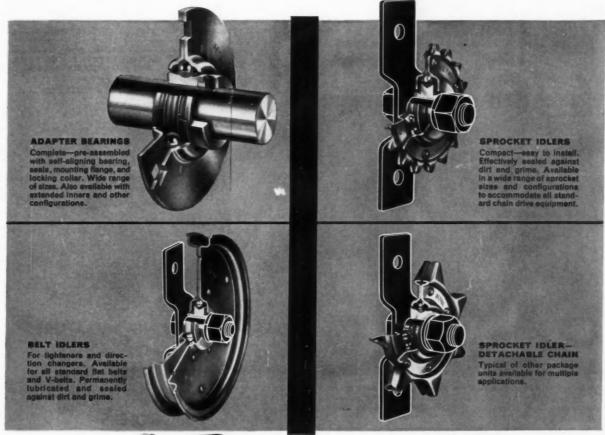
Aetna Packaged Bearing Units

REDUCE COSTS... STEP UP PRODUCTION

Low-cost Aetna packaged bearing units simplify modern assembly line production. Designed as complete, integral, prelubricated units, these bearings greatly reduce over-all assembly costs and assembly time, and minimize stock handling. Individual units are simple in design, incorporating a single row of radial ball bearings with extra large

lubricant capacity and a highly efficient seal. For all lightduty, medium speed applications, they assure dependable product performance free from troublesome servicing.

For complete information, call your Aetna representative listed in your telephone directory, or write for Prelubricated Bearing Catalog AG-59.

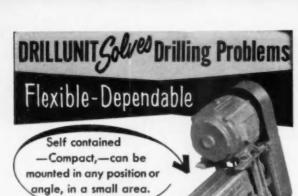




AETNA BALL AND ROLLER BEARING COMPANY
DIVISION OF PARKERSBURG-AETNA CORPORATION

4600 SCHUBERT AVE. CHICAGO 39. ILL.

ANTI-FRICTION SUPPLIERS TO LEADING ORIGINAL EQUIPMENT MANUFACTURERS SINCE 1916



Single or Multiple spindle applications, can be adapted for Drilling, Reaming, Chamfering, Boring, Counter

Stroke and feed variations obtainable without changes in the unit.—Step feed drilling possible with slight modification.

Boring and Spot Facing.

9" and 12" stroke —up to 5 H.P.

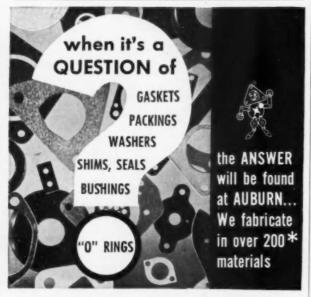
Standard Models Available from Stock

Write for literature.

DRILLUNIT, INC.

3267 Wight Street • Detroit 7, Michigan

Circle 207 on Inquiry Card for more data



Leather - Asbestos - Nylon - Vinyl - Toflon - Silicone Rubber - Neoprene - Rubber Cark - Fibre - Compositions - Phenolics - Cloth - Felt - Paper - Cardboard - Plastics Brass - Steel - Copper - Aluminum - Kel-F - Viton A - Mylar - Other Special Materials

Send specifications or blueprints for prompt quotations and recommendations. No obligation.

THE AUBURN MANUFACTURING CO.

318 Stock St., Middletown, Conn.

New York, N. Y.; Rochester, N. Y.; Detroit, Mich.; Chicago, Ill.; Minneapolis, Minn.; Pittsburgh, Pa.; Cincinnati, Ohio; Ridgewood, N. J.; Atlanta, Ga.; Memphis, Tenn.; St. Louis, Mo.; Washington, D. C.

Circle 209 on Inquiry Card for more data



Order
Eaton Caps
and
Filler Necks
from
STOCK





Let us carry the inventory

Immediate delivery on caps and filler necks now in production. Types and sizes for every use-automotive, marine, aircraft, tractors, motorcycles, lawn mowers, industrial engines. Genuine original equipment quality. Take advantage of our high-volume production-and save. Send for illustrated folder with specifications covering complete Eaton line.



MANUFACTURING COMPANY
17877 ST. CLAIR, CLEVELAND 10, OHIO

Circle 208 on Inquiry Card for more data



ENGINE COOLING RADIATORS

HEATERS

OIL COOLERS

THE G & O MANUFACTURING CO.

NEW HAVEN

CONNECTICUT

Circle 210 on Inquiry Card for more data

WHEREVER YOU ARE...



T&W SERVES YOU

In every industrial region of the United States we have offices manned by sales engineers who are experts in the design, application, and production of stampings and forgings. This caliber of engineering experience can be very helpful whether you want a favorable bid on a routine forging or stamping, or are faced with a *problem* part calling for all the assistance you can get from T & W's wide range facilities, in design, metallurgical know-how, and manufacturing ingenuity.

SALES OFFICES:

PHILADELPHIA • OLD SAYBROOK, CONNECTICUT
CHICAGO • DETROIT • DALLAS • LOS ANGELES • SEATTLE

FORGINGS & DEEP DRAWN STAMPINGS



TRANSUE & WILLIAMS

ALLIANCE . OHIO, U. S. A.

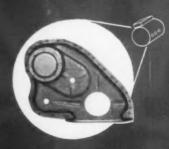
SPOTLIGHTING HOW T & W'S
WIDE RANGE FACILITIES
NELP INDUSTRY:

STEERING SPINDLE



Intricate, vital in its function, this ferging must be strong and reliable. Metallurgical laboratory, die designer, hammermon all contribute to the F & W Technalque which makes it successful.

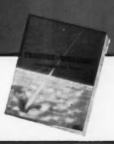
STAMPED GEAR COVER

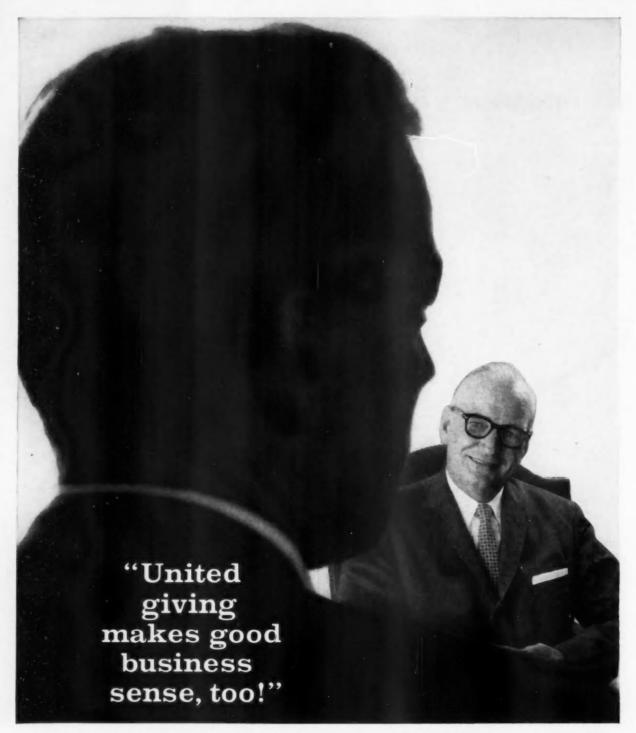


A welded assembly of both stamping and forging for a design of maximum strength. Port is 11 gauge and measures 171/2" wide, 12%" high and is 11%" deep.

WRITE FOR COMPLETE INFORMATION

7e find out how you can benefit from T & W's help, write for the 20 page booklet "Transue & Williams Challenges the Future."

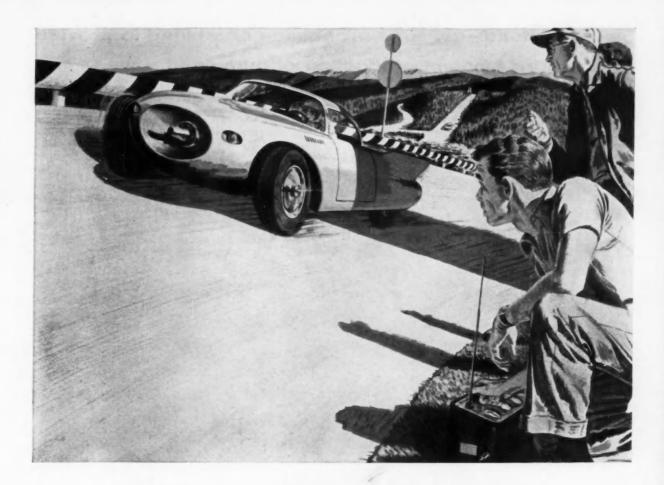




Every business has a vital stake in the welfare of its community. The businesslike way to protect these interests is to support your community The United Way. Your United Fund or Community Chest Campaign takes care of many community needs without the confusion and waste of separate appeals.

Your company can contribute in *three* important ways!
Make sure your company makes a generous corporate contribution. It helps protect the welfare of your employees and customers.
Help your employees meet their obligations through easy payroll payments. Experience shows this often doubles, even triples, results.
Stimulate executive participation in support of your local fund. Such participation helps safeguard the dollar investment made by your company and its employees.

Remember, giving The United Way helps your community and your company. GIVE THE UNITED WAY



TOMORROW'S "DREAM" IS OUR JOB TODAY

There's more to the car of tomorrow than just futuristic styling! Automotive engineers are working constantly to perfect completely new power plants-like turbine engines-to achieve yet unheard of performance and economy! And they demand bearings that are as advanced as their thinking. This is no new challenge to Bower engineers. Their many original contribu-

tions have helped increase performance and reduce bearing failure to a minimum. If your product is one which requires advanced bearings today plus realistic planning for the future, call Bower. There's a complete line of tapered, straight, or journal roller bearings for every field of transportation and industry. Bower Roller Bearing Division, Detroit 14, Michigan.





DIVISION OF FEDERAL-MOGUL-BOWER BEARINGS, INC.

'ROUND-THE-CLOCK DEPENDABILITY is one reason why the petroleum industry specifies Bower roller bearings.

LEADING HEAVY EQUIPMENT MANUFACTURERS use Bower REDUCE BEARING MAINTENANCE—Use Bower tapered roller bearings—for long, efficient life under punishing loads. and cylindrical roller bearings for your application.







AUTOMOTIVE INDUSTRIES, September 1, 1960

Circle 117 on Inquiry Card for more data

Two advanced <u>Verson</u> processes combined to provide more efficient production of machined parts.

In a perfect blending of two of metalworking's most efficient production processes, Verson has developed the Transmat-Impact Machining Press. It utilizes the Transmat principle of mechanical fingers to move the piece part from one station to the next. It also utilizes the cold extrusion principle of Impact Machining to form in two strokes of the press a part that previously had to be machined from a piece of solid bar stock by metal removal processes.

The part formed is the master cylinder for automotive

brake systems. One Transmat Impact Machining Press produces them at the rate of 30 per minute and replaces a bank of automatic screw machines. Material consumption is reduced by 47%. Impact Machining completely finishes the bore, ready for installation, and produces a significantly stronger part.

If you produce machined parts in quantity, you owe it to yourself to investigate Impact Machining and Transmat-Impact Machining. For full information and recommendations, send an outline of your requirements.



9307 S. Kenwood Avenue, Chicago 19, Illinois • 8300 S. Central Expressway, Dallas, Texas

MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES . TRANSMAT PRESSES . TOOLING . DIE CUSHIONS . VERSON-WHEELON HYDRAULIC PRESSES



Geared by Fuller ... Transcon's White-Freightliner Tractors, featuring Cummins NH-220 Diesel Engines and Fuller 5-CA-72 5-speed Transmissions, help speed shipments along routes extending from the Pacific Coast as far east as Chicago and Atlanta.

Lightweight Freightliners boost **Transcon's payloads with 5-CA*-72 transmissions

* Aluminum case and clutch housings.

To combine maximum performance with increased payloads, Transcon Lines, Los Angeles, recently purchased 100 White-Freightliner Diesel Tractors equipped with Fuller 5-CA-72 Transmissions. The 5-speed Transmissions help Transcon carry bigger payloads because the aluminum alloy

case and clutch housing of the 5-CA-72 cut transmission weight 93 pounds.

The Fuller Transmissions have proven reliable, too. Transcon has been able to extend preventive maintenance transmission rebuild cycles from 150,000 to 275,000 miles because of trouble-free 5-CA-72s.

Transcon's satisfaction with the 5speed lightweight transmissions is emphasized by the fact that the company's line equipment is equipped entirely with Fuller Transmissions.

Ask your truck dealer about the Fuller which is engineered to put more profit in *your* operation.

FULLER

MANUFACTURING COMPANY



Subsidiary EATON Manufacturing Company

Unit Brop Forge Div., Milwaukee 1, Wis. * Shuler Asla Ca., Louisville, Ky. (Subsidiary) * Sales & Service, All Products, West. Dist. Branch, Oakland 6, Cal. and Southwest Dist. Office, Tulsa 3, Okla.

Automotive Products Company, Ltd., Automotive House, Great Portland Street, London W.1, England, European Representative

Automotive Industries, September 1, 1960

Circle 214 on Inquiry Card for more data

199

AUTOMOTIVE

A CHILTON



PUBLICATION

INDEX TO ADVERTISERS

This Advertisers' Index is published as a convenience and not as a part of the advertising contract. Every care will be taken to index correctly. No allowance will be made for errors or failure to insert. When writing to advertisers please mention AUTOMOTIVE INDUSTRIES

To get catalogs, engineering data, or other additional information from advertisers, please circle appropriate number on post card at back of this issue. An inquiry card number appears at the bottom of each advertisement

^	DeVilbiss Co	Inland Steel Co185-186
Acheson Colloids Co	Dow Chemical Co30-31	International Nickel Co., Inc
Aetna Ball & Roller Bearing Co. 193	Drillunit, Inc	
41 8 1 11 8 1 8	du Pont de Nemours & Co., Inc.	K
	Delrin Div24-25	
Ajax Mfg. Co	Fairprene Div. 187	Kelite Corp
Allied Research Products Inc. 14	Dykem Co 201	Kelsey Hayes Co 4
Amchem Products, Inc		Keuffel & Esser Co
Amplex Div. Chrysler Corp. 28-29		King-Seeley Corp
Auburn Mfg. Co	E	Kohler Co 118
Automatic Spring Coiling Co 8	Eaton Mfg. Co.	
	Stamping Div. 194	L
	Valves Div 202	
в	Electric Autolite Co	Lamb Co., F. Joseph 59 thru 64
Bausch & Lomb Co. 54	Ex-Cell-O Corp 91	La Salle Steel Co110-11
Bellows-Valvair Co 126		Lincoln Electric Co
Bendix Corp. Products Div 5	F	Lindberg Engineering Co
Bethlehem Steel Co. 157		
Binks Mfg. Co	Federal-Mogul Bower Bearings, Inc.	М
Bower Roller Bearings Div. 197	Bearings Co. of America 21	M
Buffalo Forge Co145 thru 148	Bower Roller Bearings Div 197	McKay Machine Company 161 thru 163
Buhr Machine Tool Co	Federal-Mogul Div	Mahon Co., R. C
	Fuller Mfg. Co 199	Mechanics Universal Joint Div
		Mentor Products, Inc 20
С	G	Micromatic Hone Corp
		Midland-Ross Corp
Centri Spray Corp. 52	G & O Mfg. Co	Milsco Mfg. Co
Chandler Products Corp 140	Gillett & Eaton, Inc	Moline Tool Co
Chrysler Corp.	Gisholt Machine Co.	Morse Chain Co. Div. Borg-Warner
Amplex Div	Globe Union, Inc	Corp
Cleveland Crane & Engineering Co. 181	Goodrich Chemical Co., B. F 41	Corp
Cleveland Punch & Shear Works	Greenfield Tap & Die 19	
Co	Gridley Machine Div., New Britain	N
Copperweld Steel Co.	Machine Co	N 11 - 1 A C - 142 143
Aristoloy Steel Div		National Acme Co
Cotta Transmission Co. 184	Н	National Machine Products Co 184
Crane Packing Co		National Screw & Man. Co 20
Cross Company10-11	Hansen Mfg. Co	New Britain Machine Co. (Gridley
	Hartford Machine Screw Co 144	Machine Div.)
	Hassall, Inc., John	New Departure Div Back Cover
D		Norton Company137 thru 139
	1	
Delco-Moraine Div	The state of the s	0
Detrex Chemical Industries Inc 131	Imperial Brass Mfg. Co. 42	
Detroit Stamping Co	Inland Mfg. Div 43	Osborn Mfg. Co 152

P
Parker Hannifin Corp 164
Perfect Circle Corp
Performance Measurements Co 118
R
Raybestos Manhattan, Inc 22
Reeves Brothers, Inc
Research Products Corp
Rockwell Products Corp 201
Rockwell Standard Corp. Axle Div. 175
Roebling's Sons Div., John A 57
Russell, Burdsall & Ward Bolt and
Nut Co 46
S
S P Mfg. Corp
Sanborn Co
Schwitzer Corp. 172

Seibert & Sons, Inc.

Smitco, Inc.

Snyder Corp 17	19
Southern Screw Co	3
Standard Oil Co. of Indiana 2nd Cove	er
Stewart-Warner Corp	
Sturtevant Co., P. A	8
Sundstrand Machine Tool Co 88-8	19
Sun Electric Corp. 15	
Sun Oil Co	7
T	
Texaco, Inc 6-	7
Thomson Co., Judson L	9
Thor Power Co	3
Timken Roller Bearing Co	6
Tinnerman Products, Inc	7
Tomkins-Johnson Co	1
Torrington Co 5	8
Transue & Williams Steel Forging	
Corp. 19	5
U	
Udylite Corp 19	0

United Fund	
U. S. Rubber Co	5
٧	
Verson Allsteel Press Co	8
W	
Wales-Strippit, Inc	9
Wausau Motor Parts Co. 3rd Cove	r
Western Felt Works	5
Wyman-Gordon Co.	7
Y	
Yoder Mfg. Co	1
Toder Milg. Co	
Z	
Zollner Corp. 192	2



116

Circle 217 on Inquiry Card for more data





*Patented ROCKWELL PRODUCTS CORPORATION

Dept. C, 146 Central Ave., Newark 3, N. J., MA 3-7650

Circle 216 on Inquiry Card for more data

BUY BONDS



Permanent Assembly, always intact, no low-strength substitutes.

Safety engineers' first choice for most efficient handling of "heavies," 3 to 15-ton dies, etc. No J & J has ever failed. Hook swivels without loosening bolt. Permanent assembly: forged hook, swivel bushing, chrome-vanadium bolt with self-cleaning threads (hex-head has knurled ring). Send in your old J & J's for conversion to new swivel: 3-ton, \$24; 6-ton, \$29; 9-ton, \$39; 15-ton, \$59. All prices f.o.b. Mentor. Ask for latest bulletin.

MENTOR PRODUCTS, Inc.
Box 10 Mentor, Ohio

Circle 215 on Inquiry Card for more data

Do your aluminum engine programs include faced valves?

the cost may be far less than you think

The Eaton Econoseat process of applying heat-resistant and corrosion-resistant materials to valve faces makes possible a considerable saving in the amount of costly protective alloys required. This economy permits the use of faced valves where they might not otherwise be practical.

Eaton Econoseat Valves, faced with the Eaton-developed materials best suited to solve specific heat and corrosion problems, have proved their ability to provide superior durability at low cost.

We would like to help you build maximum durability and performance into your aluminum engines. Call on us—there is no obligation.





EATON

MANUFACTURING COMPANY
BATTLE CREEK, MICHIGAN

Technical Literature for your own **ENGINEERING LIBRARY**

New Catalogues, Bulletins, Data Sheets and Reports

Advertisers' Products and Services Data; and more Information on New Production Equipment and New Products described editorially in this issue

FREE POSTCARD INQUIRY SERVICE

Just circle the Numbers you want on Inquiry Postcards, and mail promptly

By C. J. Kelly ASSISTANT EDITOR

Environmental Test

The latest data on environmental testing and other applications for controlled atmospheric conditions is the subject of a new 32 page brochure. This literature covers a complete line of test equipment. Webber Mfg. Co.

Electric Eyes

Vital information and developments in design are given in a six page brochure which describes a line of electric eyes designed for industrial applications. comprehensive description of their application to automation is included along with technical information which should interest design and engineering personnel. Photomation, Inc.

Spring Data

A new booklet describes the manufacturing facilities of a 45,000 sq ft plant that makes all types of springs for industry. Illustrations and pictures are included with a general description of this operation. Stanley Spring Mfg. Co.

Capacitors

Bulletin GEA-6819B describes Computer-Grade Alumalytic capacitors for power supply in both military and commercial computers. The four-page publication gives electrical characteristics, ratings, life-test data, and dimensions including corresponding bracket configurations. Five standard case sizes including a new 1% by 4% in. can are available in a wide selection of microfarad and voltage ratings. General Electric Co.

Heat Detector Cells

Concise descriptions and detailed specifications of thermistor heat detector cells are contained in a new technical bulletin. Covered in the new technical bulletin are three models, varying in sensitivity and application, available in a variety of standard area sizes. Associated engineering drawings show Servotherm heat detector cell dimensions and internal cell construction. The bulletin also includes a section on standard flake sizes. Technical Bulletin TB 1300-6 plus other bulletins on infrared detectors and detector preamplifiers are available. Servo Corp. of America

After that use own letterhead fully describing item wanted. information on items circled below. valid 8 weeks only. further Send Postcard



Permit

United States - V Σ 100 .5 Mailed 4 ш œ Necessary if S S Stemp ш Z S Postage

2

OSTAGE WILL BE PAID BY

TOMOTIVE INDUSTRIES Village Station,

Readers Service Dept.

Readers Service Dept.

New York 14, N. Y Village Station,

PLANT ADDRESS

S POSTAGE WILL BE PAID BY Z m S Necessary S 20 = m Mailed in 7

4 the United Z

D States

Permit No.

MOTIVE INDUSTRIE

P. O. Box 66,

continued .

TECHNICAL LITERATURE

for your own

ENGINEERING LIBRARY

New Catalogues, Bulletins, Data Sheets and Reports

Advertisers' Products and Services Data; and more Information on New Production Equip-ment and New Products described editorially in this issue.

FREE POSTCARD INQUIRY SERVICE

Just circle the Numbers you want on the Inquiry Postcards and mail them promptly

By C. J. Kelly ASSISTANT EDITOR

Limit Switch

This four-page folder contains line drawings of the various applications and operating principles of the proximity limit switch. There are three examples showing comparison of characteristics and a 15 item list of typical applications. General Equipment and Mfg. Co.

Live Centers

A new twelve-page folder describes a complete new line of live centers. This folder contains illustrations, diagrams and specifications of this precision-built live center with accuracy better than 0.0001 in. J and S Tool Co., Inc.

Plastic Applications

A revised edition of a booklet describes the properties and typical end uses of plastic materials. The 12-page booklet includes detailed results of ASTM tests on the company's broad range of Luxtrex styrene, Monsanto Polyethylene and Opalon vinyl chloride molding compounds. In addition, the booklet features general information about the forms, typical uses and characteristics of Monsanto's fabricating, extruding, calendering and laminating materials; industrial, textile, surface and paper coating resins; adhesives and intermediates. Plastics Div., Monsanto Chemical Co.

Ground Support Data

The full scope of Fruehauf's ground equipment program, including the design, research, development and production phases is described and illustrated in a 20-page brochure. Fruehauf Trailer Co.

Computer Data

A new 16-page technical report, "Mathematical Applications of the Dynamic Storage Analog Computer," is available. The paper details the applications of the Dystac computer which innovates automatic repetitive operation at frequencies of 60 cps and high speed memory with a tracking error of less than one microsecond. Full schematics of computer circuitry illustrate solution of problems discussed. Computer Systems, Inc.

FREE LITERATURE -- -- USE THESE POSTCARDS

Steel Bars

A twelve page booklet describes the specifications and qualities of all-purpose steel bars. Properties, Ladle analysis, sizes, finishes and tolerances are all shown in chart style. La Salle Steel Co.

Computer Data

New 16-page technical report, "Mathematical Applications of the Dynamic Storage Analog Computer," is available from Computer Systems, Inc. The paper details the applications of the DYSTAC computer which innovates automatic repetitive operation at frequencies of 60 cps and high speed memory with a tracking error of less than one microsecond. Other applications covered include the use of continuous memory for solution in 30 seconds of complex transient operations and difference - differential problems. Full schematics of computer circuitry illustrates solution of problems discussed. Computer Sustems, Inc.

Pallet Data

A new 8-page, two-color brochure entitled "Pallet or Palletless Handling" is designed to give industrial lift truck users the pros and cons of both handling methods in order that they might select the most economical system to suit their individual job requirements. Materials handling engineers can refer to 5 pages of action photographs for ideas on how similar companies in their industry are handling their products. Automatic Transportation Co.

Storage Racks

"The Storage Rack Story" is the name given to a new 28-page brochure which discusses the considerations that must be made when storage rack installations are to be made. Durability, capacity and quality are covered in this publication. The Paltier Corp.

Automatic Welding 15

A folder of six pages describes and illustrates automatic and semi-automatic arc welding equipment. Applications for different automatic welding processes are also illustrated. Hobart Brothers Co.

Combustion Safeguard 16

sembled and exposed views of the tion accessories. Selas Corp. of America.

Cable Booklet

Catalog W3, 40 pages, provides complete information of coaxial cable as well as an up-to-date RG-/U nomenclature listing and electrical and mechanical information on cable materials and performance. Amphenol Cable and Wire Div. of Amphenol-Borg Electronics

Grinding Wheels

13

This literature describes nut inserted disc wheels, perforated discs; sectional discs; nut inserted cylinder wheels: 2 section perforated discs; perforated and slotted multiple graded disc wheels. The desired wheel characteristics necessary for efficient disc grinding production are listed and documented by suitable case histories for grinding such products as automotive parts, aluminum housings, steel universal joints, piston rings, and various cast iron parts. Macklin Co.

Cutting Tools

Bulletin MF-360, describes carbide-tipped shell end mills, straight and taper shank end mills and reamers, core drills, lathe centers and counterbores. Wessonmetal tips are used on all of these tools. Each style of tool is illustrated and all specifications are tabulated. Included in this 12 page booklet, is complete information on two models of Wesson Universal Angle Vises. Specifications are included for the two models along with illustrations showing their use in pocket milling, shaping, grinding, drilling, milling and checking. Wesson Co.

Bulletin CS-2 shows both ascompact firecheck and points out how its single sub-assembly of all working parts and its new construction facilitates installation, use, maintenance, checking, re-setting, and field conversion. Drawings, dimension data, piping diagrams and principles of operation are included, along with listings of auxil.ary equipment and combus-

describing it circled own letterhead fully items 60 information 986 After that further

Postcard valid 8 weeks

17

Hem

FIRST Permit

United States

in the

Necessary if

4

Σ

>

_ Mailed

4

ш

2

5

S

ш Stamp

Z

- S Postage

3

9 m

ZONE

TOMOTIVE INDUSTRIES P. O. Box 66,

OSTAGE WILL BE PAID BY

New York 14, N. Y. Village Station,

Readers Service Dept.

PLANT ADDRESS COMPANY **AUTOMOTIVE INDUSTRI**

P. O. Box 66

POSTAGE WILL BE PAID BY

TECHNICAL LITERATURE

for your own

ENGINEERING LIBRARY

New Catalogues, Bulletins, Data Sheets and Reports

Advertisers' Products and Services Data; and more Information on New Production Equip-ment and New Products described editorially in this issue.

FREE POSTCARD INQUIRY SERVICE

Just circle the Numbers you want on the Inquiry Postcards and mail them promptly

By C. J. Kelly ASSISTANT EDITOR

Shock and Noise Data 20

A 6-page catalog gives all the latest data on stopping vibration, shock and noise transmission by using steel spring machinery mountings. A series of 8 typical case histories, complete with actual installation photos, describe how spring machinery mounts solved a representative range of vibration problems. Easy-to-read data tables giving capacities and characteristics of the Series "L" Vibro-Isolator are furnished, including isolator sizes, load capacities, dimensions, and shipping weights. A feature of the catalog are 10 drawings of typical installation arrangements which cover almost all installation problems commonly encountered. The Korfund Co.,

Nylon Processing

An illustrated two-page reprint from The Iron Age of a technical article on methods of processing nylon parts discusses the factors to be considered in choosing from two methods of processing nylon parts-fabrication and molding. It explains why fabrication is often more suitable for short runs or prototype development. Comparative costs are discussed as well as the economics of tooling. Two photographs and one graph illustrate the article. National Vulcanized Fibre Co.

Test Instruments

Bulletin 302 describes new accessories for the Lincoln Quick-Check ignition testing instruments. New products include the Handi-Start which provides remote engine control for easier tune-up work and which features switch and separate "on-off" "start" button, a deluxe timing light with a polished chrome surface, an economy model timing light, and a pair of vinyl fender

22

covers. Lincoln Engineering Co. **Design Material**

This illustrated booklet tells the story of how fiberglas can be used in various applications and the flexibility of design that is possible with this material. Many items that were fabricated from fiberglas are pictured. Owens-Corning Fiberglas Corp.

Company History

Taking its title, "From Kite and Key to Outer Space," from the experimental activities of the Early American Sage, Benjamin Franklin, the new company history traces activities from the earliest basic application of AMP's solderless termination techniques to numerous advanced electronic components which represent the company's contribution to the Age of Space. AMP Inc.

_ S Z S Necessary S Z = Mailed m P _ = --United Z P States

> New York, N. Permit No.

FREE LITERATURE -- - USE THESE POSTCARDS



Got a piston ring problem? A lot of people with piston ring problems come to WAUSAU first because WAUSAU is a pioneer producer and designer of quality piston rings, sealing rings, valve seats and other precision parts-serving the major manufacturers of gasoline and diesel engines, automatic transmissions, compressors, and hydraulic units. This has been going on for nearly forty years, but today's WAUSAU products are being manufactured in a brand new plant that's as modern as tomorrow in every respect. May we tell you more about our products, our engineering and development service and our plant facilities? Write or call . . .

WAUSAU MOTOR PARTS COMPANY . 2300 Eau Claire Street Schofleld, Wisconsin





PRODUCT INFORMATION



NEW LAND-RIDING SEAL (Pressed) and SENTRI-SEAL

This exclusive seal combination is available in N/D's new heavy-duty conveyor ball bearings. Land-Riding seals, especially resistant to moist contaminant penetration, are available separately in N/D's bearings for hay rake tine bar, plow, hiller and coulter applications. Tandem seal arrangements are also available.



NEW SENTRI-SEAL

N/D's most versatile seal . . . available in most single row, non-loading groove and small double row N/D ball bearings. N/D Sentri-Seals are recommended for applications with moderate to severe contaminant conditions as found in light duty diess, idler pulleys, cam followers, implement wheels, adapter bearings and similar applications.

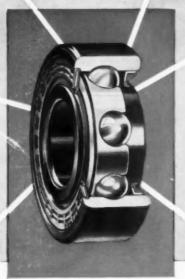


NEW DOUBLE "O" SEAL

NEW LAND-RIDING SEAL (Crimped)

N/D's newest seal design. Efficient single lip, low-torque seal protects against moist or dry contaminants. Retains bearing lubricant-for-life. Recommended for farm implement discs, idler pulleys, wheels and similar applications. Available also with metal trash guards to protect seal against mechanical damage from trash windings.

N/D's most original seal design, used in fan and water pump bearings where water seepage is prime source of bearing contamination. Synthetic rubber seal rides smooth shaft 0.D., offers reliable tow-torque sealing and eliminates relubrication.





NEW TRIPLE LIP SEAL

N/D's most rugged seal . . . used where moist and dry contaminant conditions are most severe. Seal eliminates relubrication maintenance. It's available in N/D square and round bore ball bearings with either spherical or cylindrical O.D.'s.

Introduces 5 New Integral Ball Bearing Seals!

Now, New Departure offers a versatile line of new integral seals for N/D precision ball bearings. Each N/D seal is engineered to retain bearing lubricant for life... and offer maintenance-free service. These seals are designed to give manufacturers a broad selection to choose from for a specific application.

Modern design N/D seals are made of synthetic rubber with supporting steel components for precise

control of sealing lip flexibility and torque. Whatever the application, you'll find an N/D integral seal and ball bearing to fit it. All seals are available in popular sizes of New Departure ball bearings.

Write today for N/D's Integral Seal Bulletin. For detailed information, contact the N/D Sales Engineer in your area. New Departure Division, General Motors Corporation, Bristol, Connecticut.



NEW DEPARTURE

BALL BEARINGS

proved reliability you can build around

Circle 103 on Inquiry Card for more data

